THE ARCHITECTURAL FORUM

OCTOBER
1922

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THE ARCHITECTURAL FORUM

VOLUME XXXVII NUMBER 4

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PLATE ILLUSTRATIONS

LETTERPRESS

ALBERT J. MacDONALD, Editor

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THE EDITOR'S FORUM

MOTION PICTURES HELP CONSTRUCTION

SINCE the services of the motion picture are being utilized to promote the welfare of many forms of activity, its use in promoting building is quite logical. In several parts of the country, notably in California and Ohio, much interest has been stimulated by the construction of "model houses," suitably furnished, the theory being that anyone seeing such a model would be apt to become a home owner. But since the appeal of even the most attractive model home could be at best limited to its own immediate locality, some more universal means of appeal was seen to be necessary,—and what more logical than the motion picture?

The demand has brought about what is described as the creation of a five-reel film which will show the actual erection of a modern 6-room brick colonial house, together with its equipping and furnishing, the final scenes probably showing the house as the home of a happy and contented family. To make the presentation as interesting as possible, an unusually attractive suburban plot has been selected, and since the production of these pictures is to be done with the co-operation of many organizations associated with the progress of building, it may be safely assumed that the production will do justice to the subject matter.

The films are described as holding the spectators' excited interest from beginning to end. They are said to correct some of the popular misconceptions of the difficulty of building and to leave the observer with a strong desire to become a home builder.

That the display of these motion pictures will be widespread is guaranteed by the fact that the films will be shown all over the country under the auspices and with the co-operation of real estate boards, commercial, advertising, Rotary and other clubs and organizations, churches and community centers.

A CORRECTION

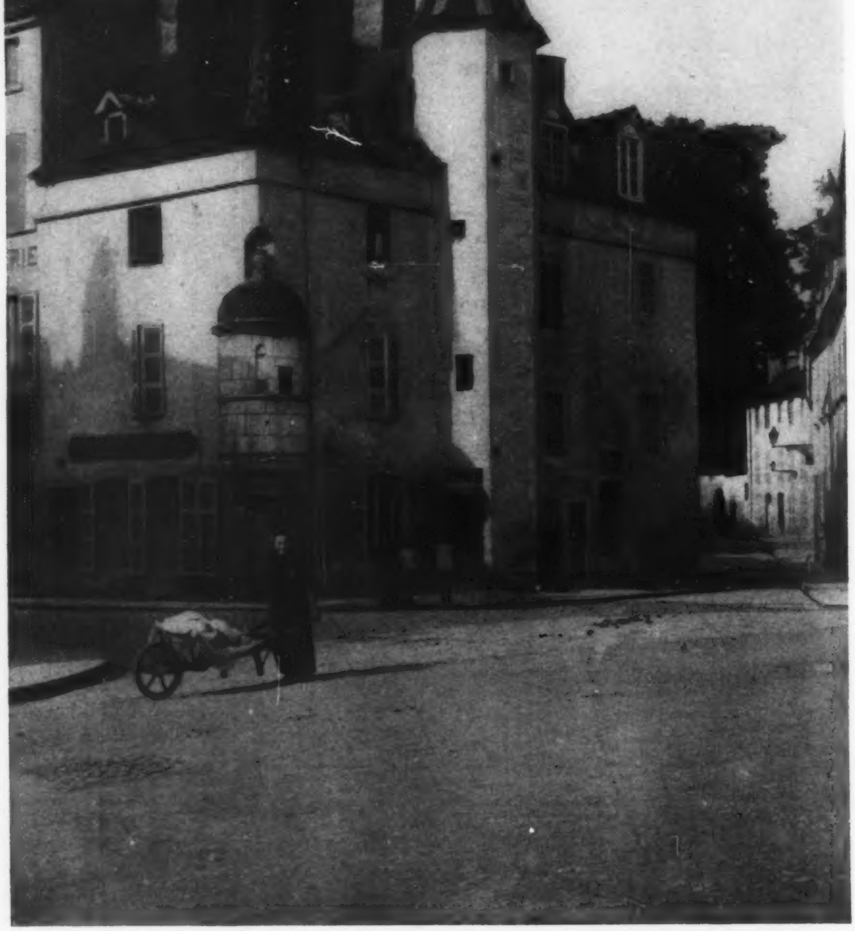
WE regret to find that an error was made in connection with the illustrations accompanying the article entitled "The Modern Publishing and Printing Building" in THE FORUM for July. The illustrations upon pages 5 and 6, instead of showing the pressroom and the bindery in the plant belonging to the Metropolitan Life Insurance Company, portray similar departments in the establishment of the J. F. Tapley Co., other tenants in the building. Further errors were made in writing of equipment in printeries and binderies by crediting to the Metropolitan workrooms certain layouts of machinery which we find belong to the same manufacturers.

MOUNTING BUILDING COSTS

IN addressing the presidents of some 200 national organizations identified with the building industry, Franklin D. Roosevelt, the president of the American Construction Council, points out the existence of certain dangers which threaten the prosperity of building. It will be remembered that the boom in construction which prevailed during the 1919–20 period was attended by an unusual advance in wage rates and material prices and was followed in due course by the inevitable era of depression which comes after a period of unsound business activity.

The present heavy demand for everything which enters into building might easily result in a repetition of the history just referred to; the prices of building materials have risen sharply, with the rates paid to building labor not far behind, if not slightly in advance. Specific instances of abnormal costs are not lacking, resulting in several cases in the curtailment or abandonment of extensive building programs. In Philadelphia the cost of school building has advanced 18 per cent over the low index of 137 of last spring, on a basis of the 1913 index of 100, and this increase has already led to the postponement of a large part of Philadelphia's projected school building campaign. Costs of residence building are increasing in Cleveland, where up to August 1 of the present year the value represented by building permits reached nearly $20,000,000, or almost twice their value during the same period a year ago, but the cost of this construction is so great that it necessitates the asking of exorbitant rentals in order to obtain even a fair return on the money invested. In the Boston district the prices of building materials have advanced about 17 per cent over cost of the same materials last January, while the wage rates of labor have soared, the closely unionized trades, such as bricklayers, plasterers and carpenters and skilled workers in certain other trades now being advanced to the same wage scales which prevailed at the peak of high costs.

The uncertainty attending building costs works considerable hardship upon architects. Clients are often impatient to build notwithstanding the excessive cost of building, and yet an architect who has his clients' interests at heart and who keeps in touch with the fluctuations of construction costs is apt to feel unable to recommend building at the present expense. It is earnestly to be hoped that the warning to the industry by the president of the American Construction Council will have the effect of curbing the tendency to maintain prices at a point which would result in grave injury to the public.



PLACE MAUFOUR, BEAUNE, FRANCE
FROM PHOTOGRAPH BY G. DOLBY

The
ARCHITECTURAL FORUM

VOLUME XXXVII — OCTOBER 1922 — NUMBER 4

Harwood House, Annapolis

By HAROLD DONALDSON EBERLEIN

Measured and Drawn by J. FREDERICK KELLY, A. I. A.

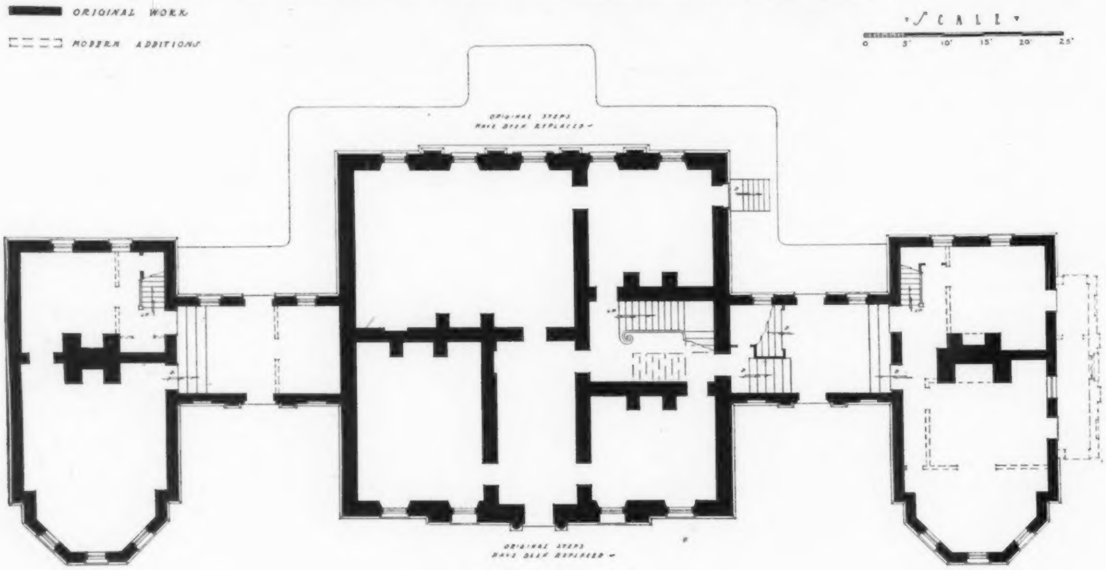
HARWOOD HOUSE, at the corner of King George street and Maryland avenue, in Annapolis, is deservedly one of the show places of that architectural paradise, rich in its possession of many unspoiled Georgian houses of the finest character. In 1774, when it was built, the house was designed as a wedding gift,—so goes the story,—from Matthias Hammond to his intended bride. He had even ordered all the furnishings with punctilious care, and the wedding day was set, when the lady declared that he paid more attention to his new house than he did to her and would have nothing more to do with him. Hammond remained a bachelor. After several changes of ownership the house passed by purchase to Jeremiah Townley Chase, who bought it in 1811 as a home for his daughter, from whom it eventually descended to her granddaughter, Miss Hester Ann Harwood, the present owner.

The architect was William Buckland, an ancestor of the owner, of whose other work one would gladly know more. His achievement in Harwood House stamps him as a man of no mean ability and whets the desire to learn further of his architectural labors. Unfortunately, owing to the paucity of existing records, we are obliged to content ourselves with this single testimony to his capacity, the excellence of which, however, is sufficient to establish his reputation. It is interesting to note that his portrait, showing him seated at a table with his instruments and a draft of the elevation and plan before him, is still preserved in the house he designed. The structure has always been cherished by its owners and has never suffered from neglect, the defacements of ruthless alteration, or the ravages of war, and thus possesses an enhanced value as an intact record of eighteenth century architectural achievement.

Detail of Street Entrance, Harwood House

The fabric is of red brick laid in Flemish bond, while the projecting string course between the lower and upper floors and the splayed lintels above the windows are of rubbed brick. In numerous instances the rubbed bricks of the lintels are marked with false joints to ensure the utmost precision of appearance. Even the rubbed lintels over the cellar windows have received this same meticulous care and bear witness to the desire for perfection of finish which is amply attested in every particular of this dwelling from top to bottom, both inside and out. The broad mortar joints between the stones of the foundation walls, which appear above the ground level, are galleted with little spawls. The practice of galleting the mortar joints of stone masonry, as shown by not a few similar instances in the vicinity, seems to have been a

GENERAL STREET VIEW. PORCH AT EXTREME RIGHT IS MODERN WORK



FIRST FLOOR PLAN

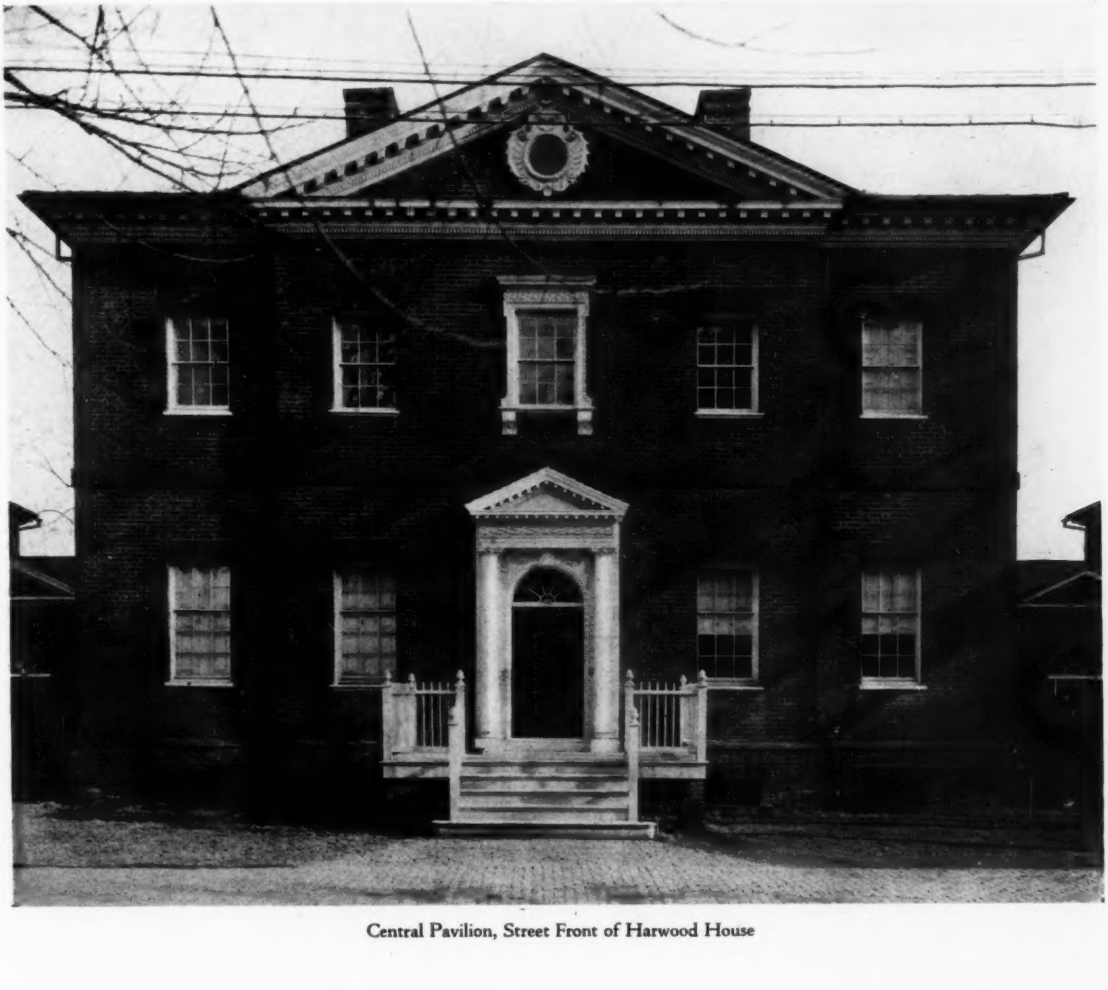
HARWOOD HOUSE, ANNAPOLIS

local tradition, as it was also in the neighborhood of Philadelphia.

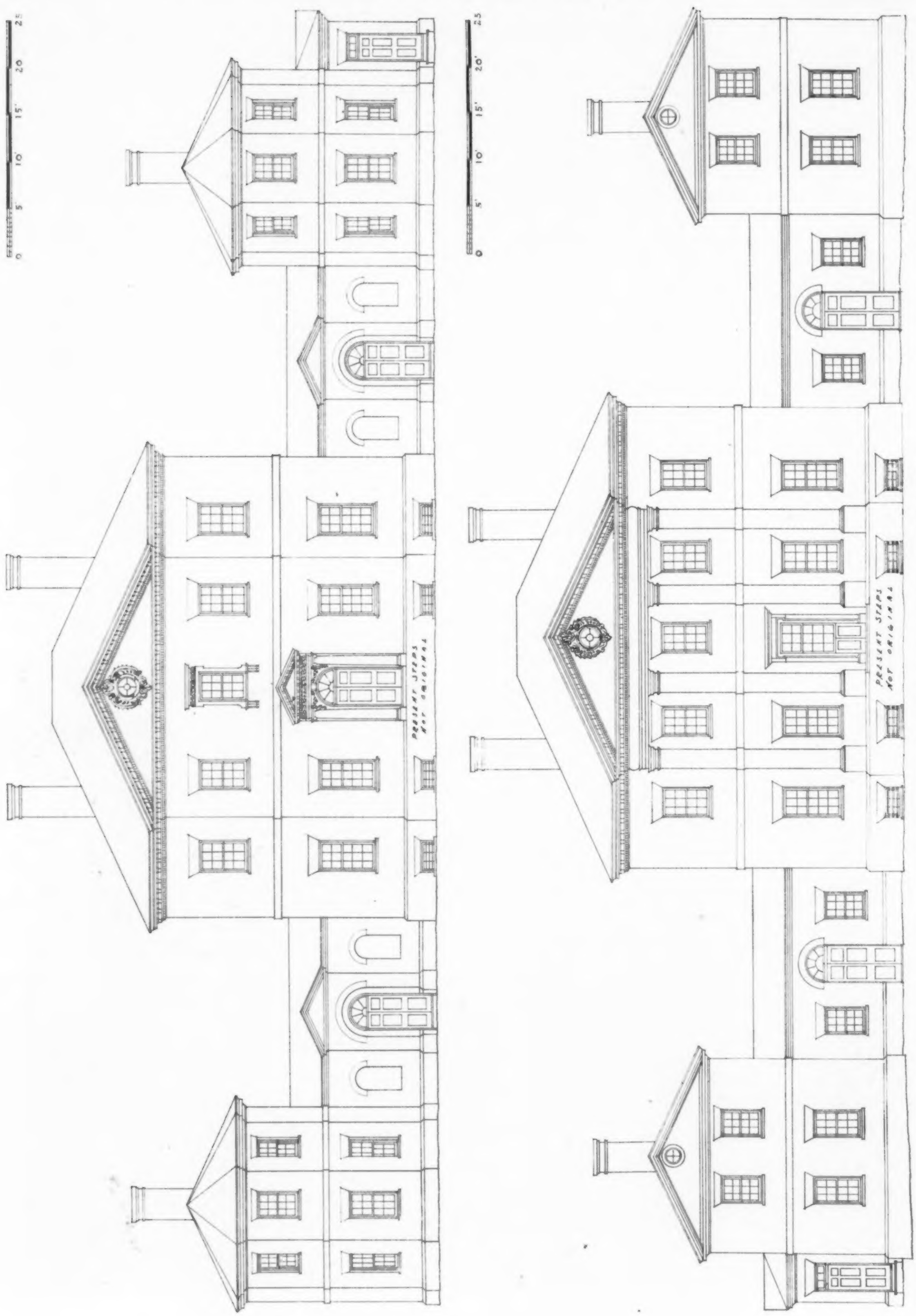
The projecting base is capped by two courses of moulded bricks, the lower course a half-round or torus, the upper a scotia. More moulded bricks, of appropriate profile and the utmost refinement of finish, appear in the bases and capitals of the four pilasters which grace the garden front. It will be observed that the horizontal emphasis of the garden elevation has been ingeniously preserved by breaking the string course around these pilasters. The arches above the doors and recessed panels, in the walls of the two connecting galleries between the main house and its wings, are likewise of rubbed brick, thus supplying a certain slight degree of color emphasis for structural features without resorting to the bolder expedients of color contrast or projection. A further touch of interest is given by introducing within these panels the all-header bond which enjoyed such popularity in Annapolis. This bond, so far as is known, was peculiar in the eighteenth century to Annapolis and Chestertown, and was presumably borrowed from a usage more or less common in the midland counties of England.

There are some distinct traces which show that the very inadequate wooden steps, both before the street door and the garden door, are later substitutions and are not those contemplated by the architect in the original design. Even were these traces lacking, it would be impossible to attribute the present steps to Buckland or to believe that anyone who had succeeded in creating such an architectural gem as the house is otherwise could have failed so utterly in providing suitable means of access to its entrances. Justice to the architect's memory demands allusion to this apparent shortcoming. These steps and a small vestibule addition at the side of the south wing, rendering it suitable for use as a separate residence, are the only changes made to the fabric since its erection.

The exterior woodwork, of both the street and garden fronts, exhibits the most exquisite delicacy of workmanship joined to a wealth of design at once robust and elegant. Both the disposition and the execution of the swags and drops of ribbon, fruit and flowers that adorn the spandrels above the main door are singularly felicitous and full of lively grace. Unfortunately, the ends of the volutes of



Central Pavilion, Street Front of Harwood House



ELEVATIONS, HARWOOD HOUSE, ANNAPOLIS
MEASURED DRAWINGS BY J. FREDERICK KELLY

the little crushed capitals surmounting the engaged columns of the doorway have become unglued and dropped off; otherwise the carved ornamentation is intact. It is to be regretted that many successive coats of paint have almost obliterated some of the more minute details of enrichment, such as the acanthus cyma beneath the pulvinated frieze and the smaller carved cyma below the broad fillet. These particulars, however, appear in all their pristine crispness in the measured drawings. At the same time, the agency of accumulated paint gives the inbricated band of water leaves on the frieze an agreeable mellowness. The three points of carved embellishment on the street facade—doorway, window frame, and bold cartouche surrounding the attic bull's-eye light in the pediment—are happily conceived and give a distinguished individuality to the whole composition. The garden doorway, though of a totally different type, possesses no less charm of refined design and execution than does the street doorway.

The interior woodwork is equally deserving of praise, and the excellence of the joinery matches the quality of the carving. In the dining room, from which opens the garden door disguised within as a window, and in the ball room directly above, we find the greatest elaboration lavished. The carved mouldings surmounting the baseboard and the carved chair-rail, with its gadrooned quarter-round crown, carry completely around the circuit of the rooms notes of continuous enrichment, reaching appropriate climaxes in the decoration of the doorways and fireplaces. The pattern of the inside folding shutters, with alternating elongated and equal-sided octagon panels, the latter enclosing foliated carved rosettes, is characteristic of Annapolis and is found in several other houses of a somewhat earlier date. The present color scheme, it is scarcely necessary to add, is not original and sadly detracts from the value of the carved decoration. It seems to have been applied at some time during the "seventies" or "eighties." In all probability the woodwork was painted white and may have had the additional embellishment of parcel gilding, as we know was the case at Mount Vernon and in several other places. Despite their present unedifying color, the mind's eye can readily see what these rooms must have been in their original glory.

Inspection of the plan will show that the staircase did not figure in the entrance hall but was enclosed in a separate stair hall at one side, the architect in this respect choosing to follow a certain phase of Palladian precedent, ensuring an air of greater formality to a comparatively small house.

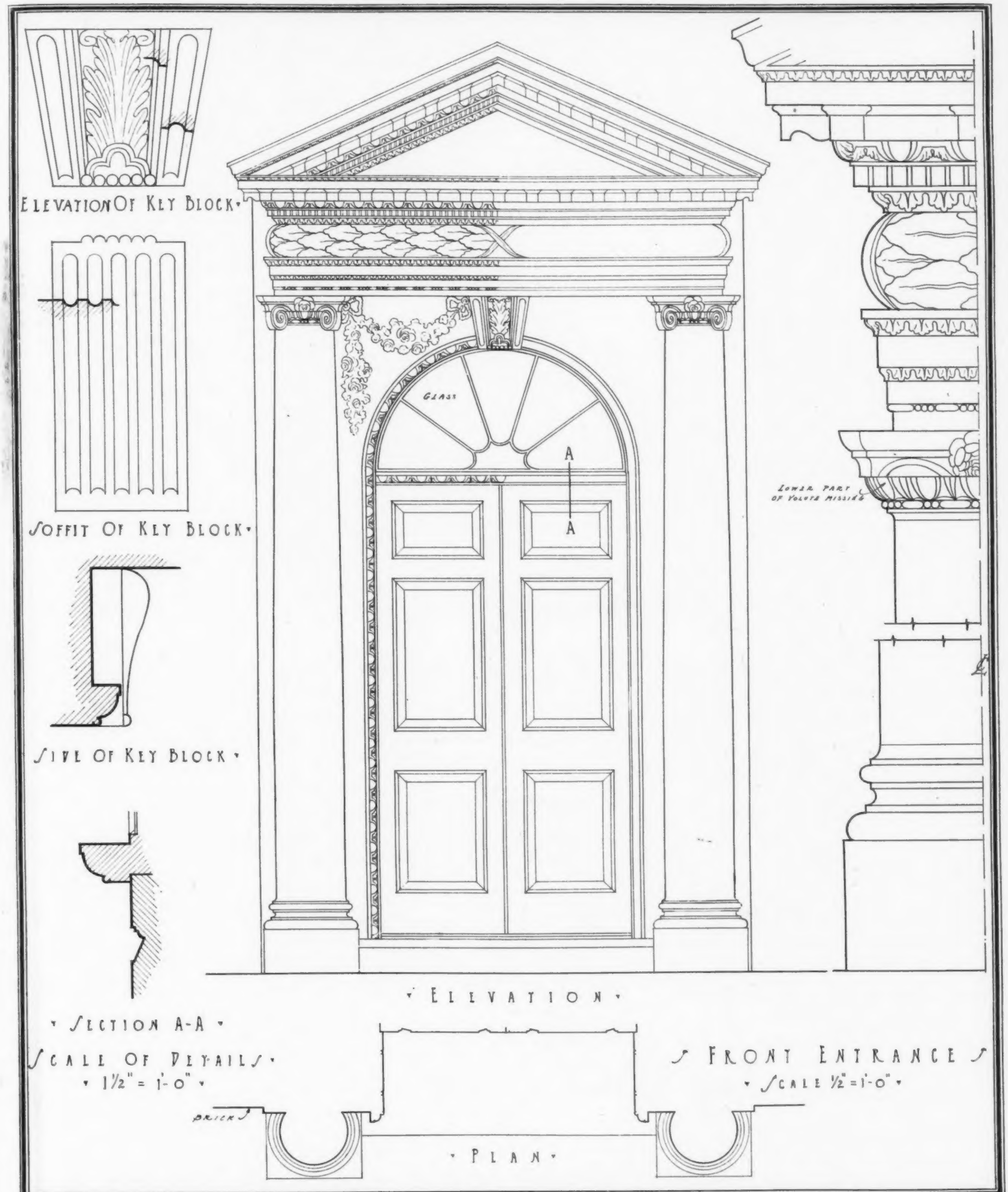
Central Pavilion, Garden Front of Harwood House

The kitchens and house slaves' quarters were in the south wing, an arrangement which entailed no inconvenience in days when there was no lack of domestics for expeditious service. The north wing, now used as a separate dwelling, had no direct connection with the rest of the house. The original owner, and several of those succeeding him, were barristers and used this north wing for their offices.

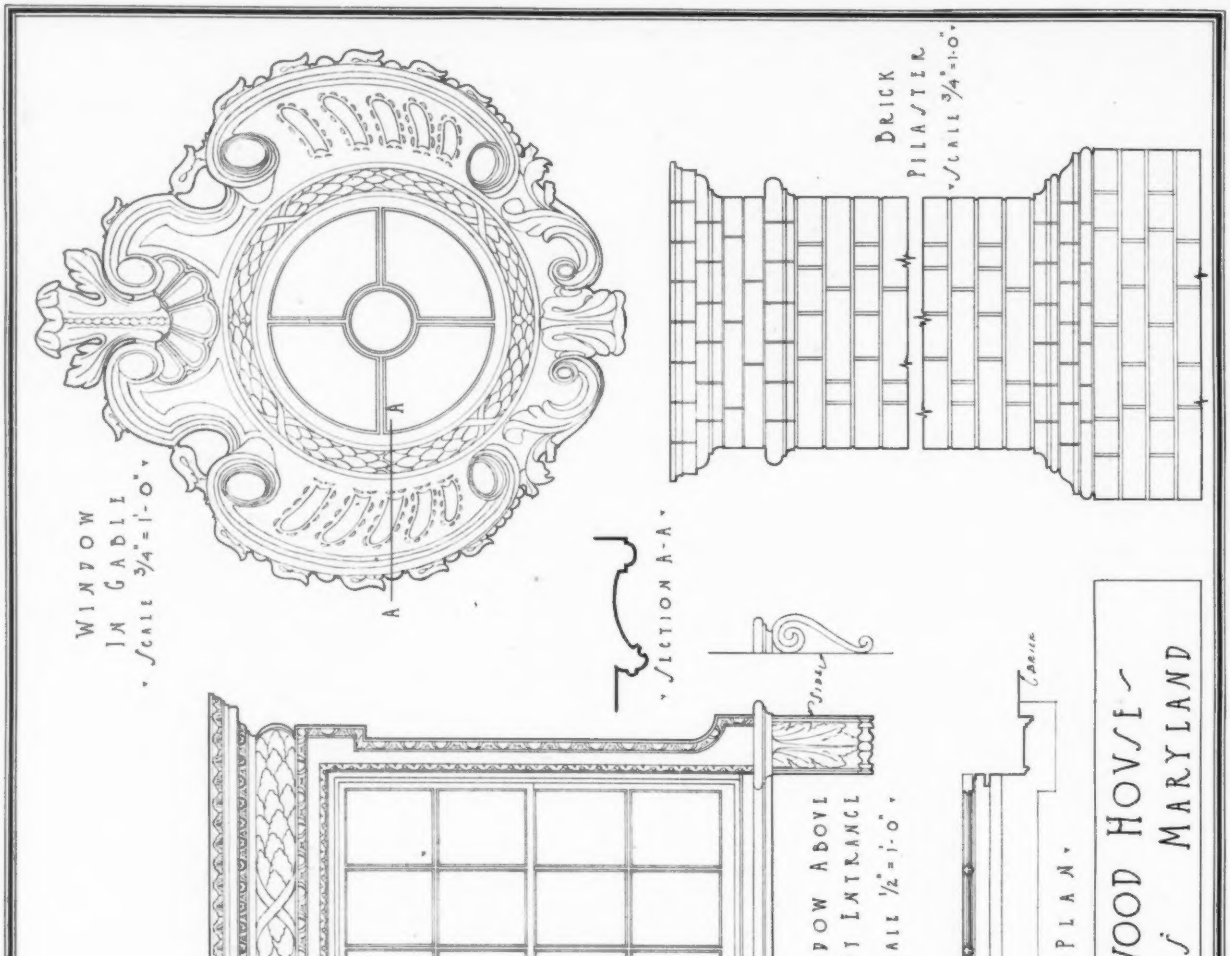
There is a tradition in Annapolis that Matthias Hammond at first intended to build his house without wings and three stories in height. Edward Lloyd IV, of Wye, who then owned and occupied the Chase house on the opposite side of the street, saw that if this plan were carried out it would completely shut off his view of the bay. Representing this objection to his friend Hammond, the latter, in consideration of some financial inducement, consented to alter his plan and build instead a lower house with wings at each side.

Its lesson as a piece of composition is a most wholesome subject of contemplation for us at this time, for it is an unfortunate fact that in certain quarters domestic design in any of the phases the classic mode has assumed since its adoption in England has fallen into a state of deplorable dullness. There are architects—would that they were fewer in number!—who seem to feel that they have discharged all obligations on the score of

Street Doorway of Harwood House



MEASURED DRAWING BY J. FREDERICK KELLY



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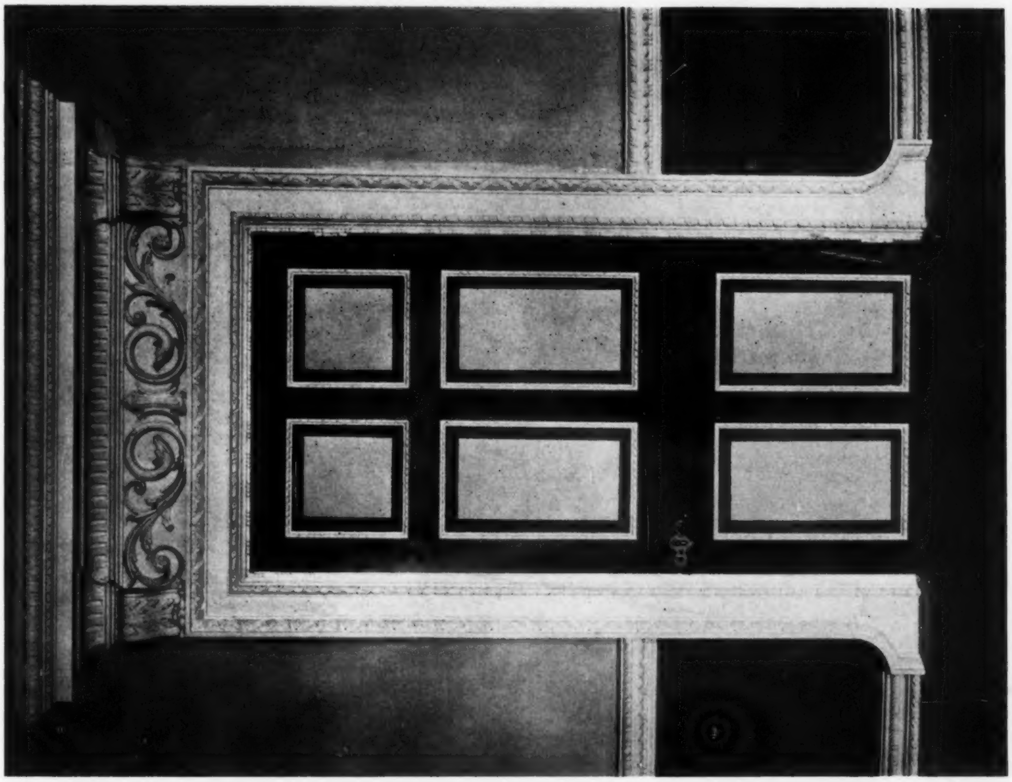
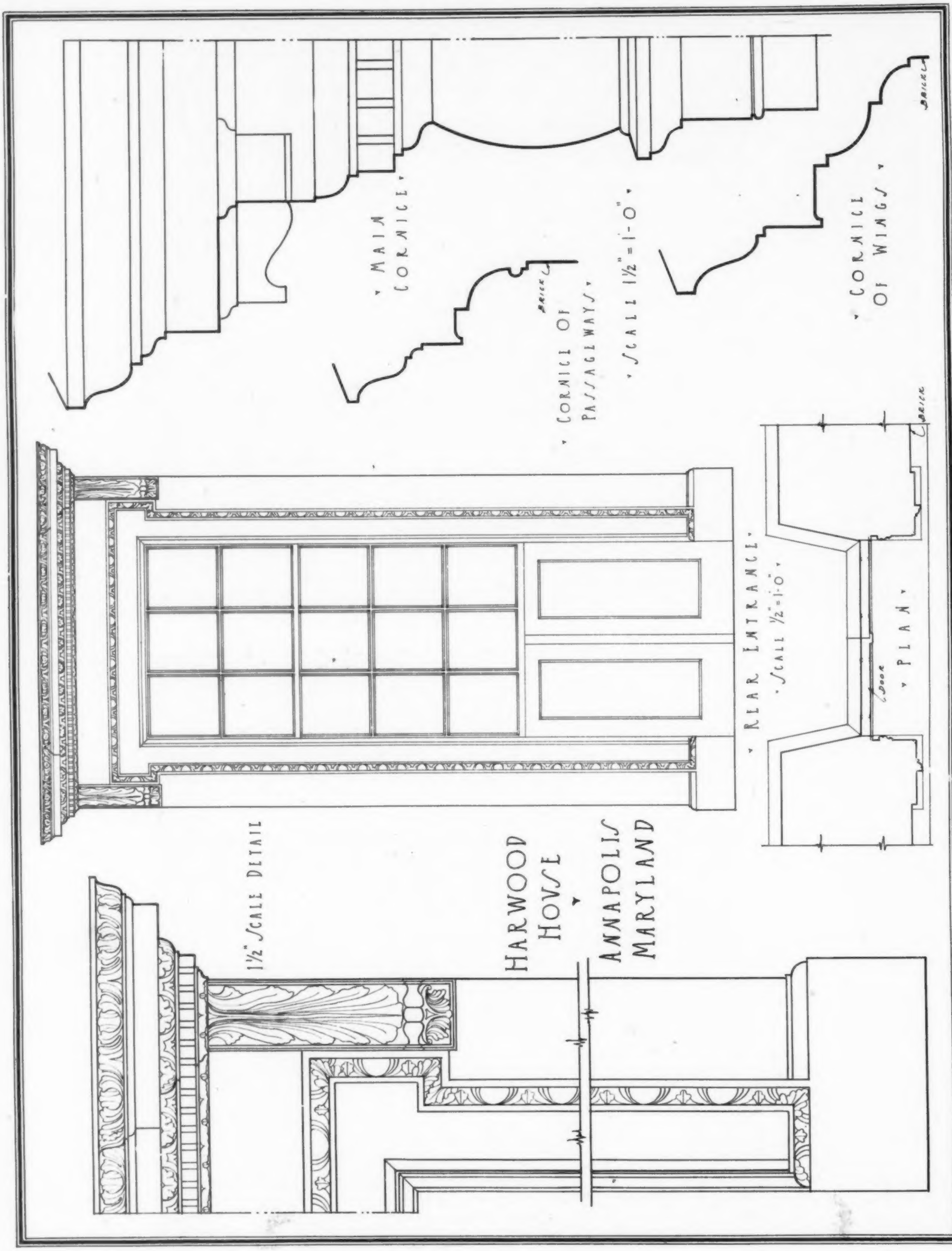
DETAIL OF FIREPLACE



DETAIL OF DOORWAY

DINING ROOM, HARWOOD HOUSE, ANNAPOLIS

MEASURED DRAWING BY J. FREDERICK KELLY



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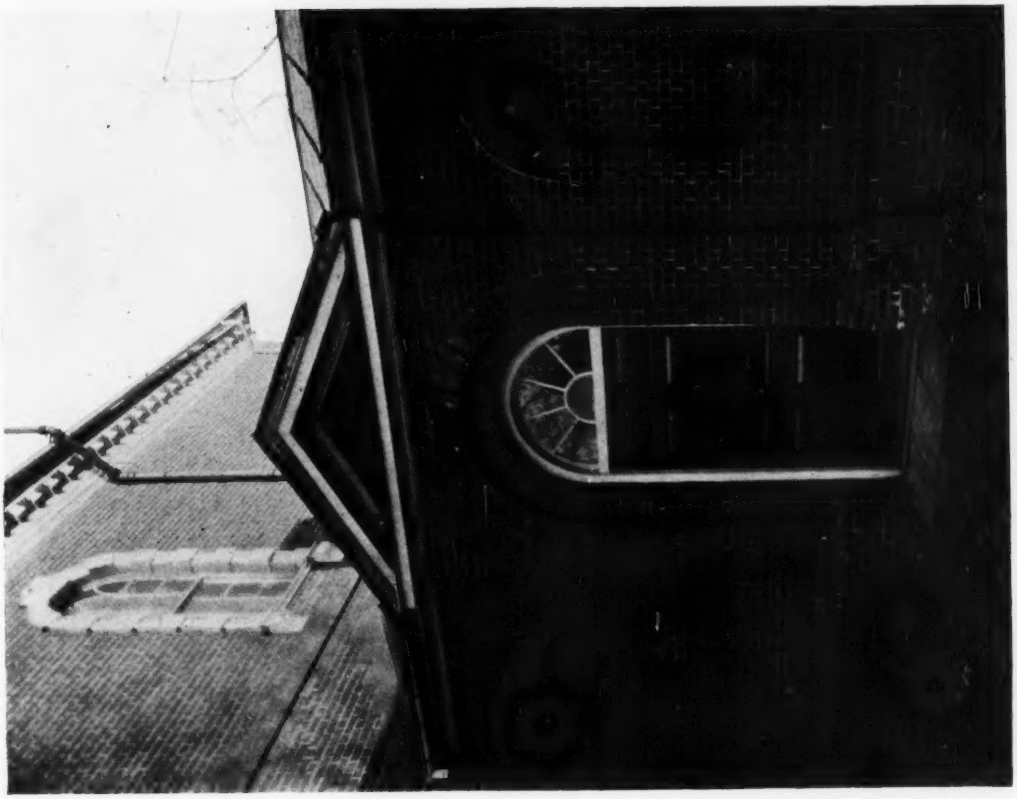
GARDEN DOORWAY



GALLERY BETWEEN PAVILION AND WING

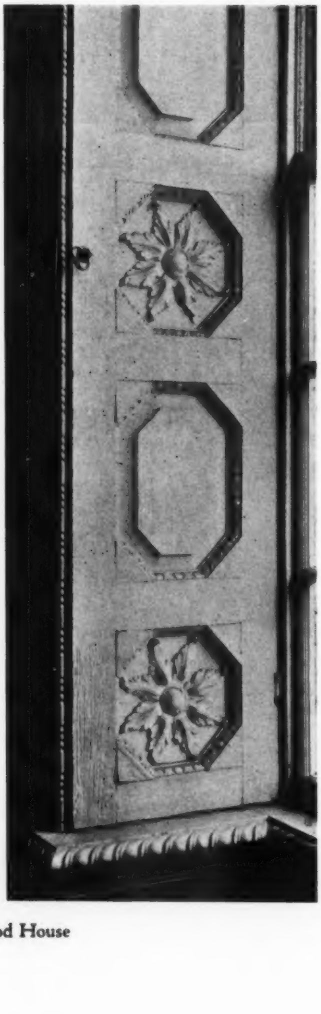
HARWOOD HOUSE, ANNAPOLIS

MEASURED DRAWING BY J. FREDERICK KELLY

invention when they plan a rectangular mass, provide the elevation with certain perfunctory penetrations, and then append a complement of hackneyed details that convention prescribes. To view the classic mode as a stereotyped medium excusing the exercise of ingenuity on the part of the architect is the height of folly. As a matter of fact, there is just as much scope for inventive originality in the domestic classic style, practiced in England and America, as there is in any other form of architectural expression. To be convinced of this one need only study thoroughly the domestic architecture of England and America from the latter part of the seventeenth century to the early years of the nineteenth. Such an example as Harwood House helps to bring this truth home to us.

If it be urged that a compact plan is demanded by a majority of clients and that compliance with this requirement militates against diversified composition, we submit that the objector may find some food for profitable thought in a perusal of the volumes published by Crunden, Plaw, Pain and others about the beginning of the nineteenth century. No one would think for a moment of adopting their plans as they stand, but the plans are susceptible of rearrangement to suit current needs, and they were made for houses in which considerable diversity of composition was achieved.

In another respect a critical scrutiny of Harwood House will repay the reader. The street front is distinctly mid-Georgian in its dominant characteristics. The only conspicuous suggestions of the late Georgian manner are the partial-octagon ends of the wings and the dimensions of the windows with their system of glazing. Even in this latter particular there is a departure from cut-and-dried usage in the employment of moulded sills. In the garden front we find a distinct reversion to a much earlier type of design, reminiscent of the restoration-Queen Anne manner, with the rectangular-headed door, the pilasters extending the full height of the facade, and the vigorous entablature with its torus frieze. And yet no one can deny that the ensemble is singularly harmonious and seemly. In other words, the architect did not find himself trammeled by any lack of elasticity in creating an orderly expression of classic methods. Here is something for hidebound purists to ponder over.



Details of Windows and Shutters, Dining Room, Harwood House

Concrete Construction

IV. DESIGN CONSIDERATIONS

By WALTER W. CLIFFORD, *of Clifford & Roeblad, Engineers*

CONCRETE designing is complicated compared with that of the average wood or steel framing. To teach any man to design concrete is not within the scope of a magazine article, but it is of interest to the student of concrete, as well as to the architect who must use it, to compare the designing of concrete with that of wood and steel and to consider a few practical points in the designing of concrete details.

There are two reasons in particular for the complications of concrete design. First, concrete framing is monolithic, that is, its beams are continuous and are rigidly attached to the columns. It is true that a steel skeleton is riveted together into a rigid frame, but for reasons to be further explained beams and columns are considered as merely supported excepting when designing for wind stresses in tall structures. The second complication is due to the fact that two materials are used together. Concrete construction has brought about the common use of the continuous beam theory in this country. The principal assumptions behind this theory are: (1) a constant moment of inertia, and (2) level supports. The first assumption does not hold true in concrete, but it causes a variation of not ordinarily over 10 per cent. The second assumption involves the reason why concrete beams are designed as continuous and steel beams are not. The variations of external moment and shear with small differences in the height of supports are large. A variation of a fraction of an inch may double the stress. It is not possible in ordinary construction to adjust supports for rigid, shop-fabricated steel with sufficient precision to insure absolutely uniform bearing on all supports. With concrete, on the other hand, the supports are automatically leveled by the pouring of the concrete in a plastic state.

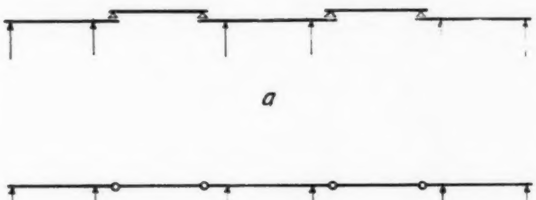


Fig. 1

The moment over the supports of a continuous beam is commonly called "negative," which is just by way of saying that beam action is the opposite of that in a simple beam, the tension being at the top and the compression at the bottom. The cantilever or beam with one fixed and one free end illustrates the most common case of negative moment. The continuous beam is in effect the same as the cantilever construction often used in bridges. (See Fig. 1a). The simple beam between the ends of the cantilevers can obviously be lighter than if it spanned the entire distance between supports. If the cantilevers be made a proper length and a hinge introduced at the ends, as shown in Fig. 1b, the whole structure becomes a continuous beam.

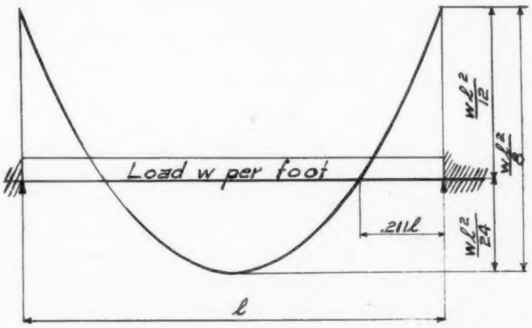


Fig. 2

The cantilever portions have negative moment and the central spans have positive moment. The hinges are the "inflection points," so called, where there is no moment.

The variation of moment in a uniformly loaded beam with fixed ends is shown in Fig. 2. An interior span of a continuous beam having many spans is the same. For comparison, the moment curve of a simple beam is shown in Fig. 3. The maximum moment in this case is given by the familiar formula, $\frac{wl^2}{8}$. The fixed or continuous beam has the same moment curve, but it is lifted up and shows a negative moment at the support of $\frac{wl^2}{12}$ and a positive moment in the center of $\frac{wl^2}{24}$.

The only way in which the negative moment can be greater than as computed is by a lifting of a support. Outside the earthquake belt this does not ordinarily happen, hence the common use of $\frac{wl^2}{12}$ for negative moment at interior supports of continuous beams, with equal spans. The settlement of a support, on the other hand, may occur through the unequal settlement of foundations or by the deflection, under load, of supporting girders. Such settlement will increase the positive moments. For this reason most design specifications and building laws call for $\frac{wl^2}{12}$ at the center of the span as well as at the support. This is a rather high excess factor

of safety, and the recently published Joint Committee Specification allows $\frac{wl^2}{16}$ for positive moment in certain cases where beams and supports are monolithic. It will be some time, however, before this is embodied in building laws. Similarly, the moment at the center of end spans and at adjacent supports is $\frac{wl^2}{10}$.

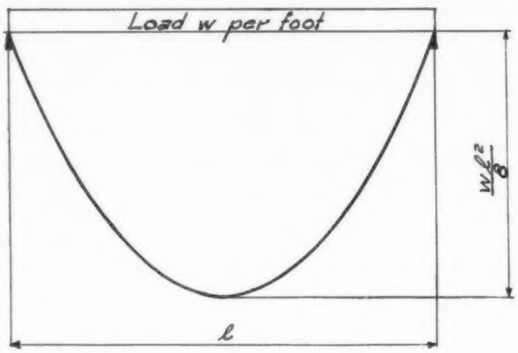


Fig. 3

Most concrete framing is continuous for several spans, and the approximate sizes of members for normal conditions, which everyone connected with the building industry carries in his mind, are based on conditions of continuity. In the unusual case of a single span, therefore, allowance must be made for a 50 per cent higher moment and consequent increase in size of members.

In all the designing thus far dealt with, equal spans are assumed as well as uniform loads. When spans are not equal, the case is much less simple. The longer span has greater relative effect, so much so that a short span between two long spans, as is common in schoolhouse construction, may have negative moment through its entire length. The shape which such a beam will take under load, together with its moment curve, is shown in Fig. 4. The theorem of the three moments, on which the continuous beam theory is based, and also the results of its application to a variety of cases, are given in standard text books. For anyone not experienced in concrete design to apply published data to specific problems, however, is, to say the least, a tedious process.

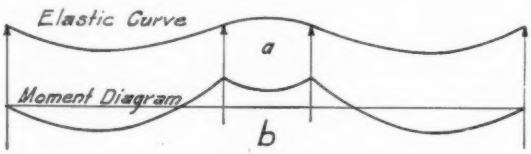


Fig. 4

Reinforced concrete is a combination of concrete to take compress on, with steel to take tension. The two materials have nearly identical coefficients of expansion, which makes their combined use a possibility. One of the first points which differentiates concrete design computations is the neutral axis. Instead of coinciding with the axis of symmetry the neutral axis of a reinforced concrete beam is a function of "n" (the ratio of the moduli of elasticity) and "m" (the ratio of the fiber stresses). It is approximately three-eighths of the depth from the compression side, with the commonly used stresses.

Beams are designed for shear and moment, and it may be of interest to compare the distribution of shear and moment in a concrete beam with that of the more familiar wood and steel. The straight line distribution of direct stress intensity, due to bending, as shown in Fig. 5, varying from zero at the neutral axis to a maximum at the outside fibers, is familiar to all. The total stress curve on the projection of any cross section will be the unit stress at each point multiplied by the corresponding width. In a concrete beam, the stress in the reinforcement w ll be further multiplied by the ratio of the moduli of elasticity. Fig. 6 shows the variation of total stress on a projected cross section for a rectangular wooden beam, a steel I-beam, and a rectangular concrete beam.

The horizontal shear between any two beam cross sections must balance the difference in direct bending stress at the two sections. It varies with the difference between the total stress curves, as shown in Fig. 7. It will be zero at the outside fiber and increase by decreasing increments to a maximum at the neutral axis. These curves are shown with the direct stress curves in Fig. 6. In ordinary concrete design, tension in the concrete is neglected as shown by the case in Fig. 6c. Actually, the concrete does take tension for a short distance below the neutral axis, and the curve shown in Fig. 8 is nearer the truth than those in Fig. 6c. The ordinary assumption is on the safe side and involves only a very slight error.

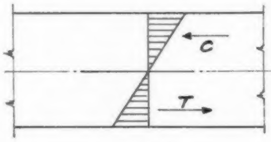


Fig. 5

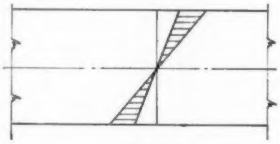


Fig. 7

A further analogy between a typical concrete beam and the familiar plate girder is also interesting. Fig. 9a shows a typica plate girder section, and Fig. 9b a similarly shaped plain concrete beam. The lower concrete flange is, we know, not as efficient in taking the tension as steel rods would be, but steel rods have a modulus of elasticity about 15 times that of ordinary concrete. That is to say, for the same stretch, the steel rods will take about 15 times as much stress as the concrete, so that the concrete tension flange can be replaced by steel of one-fifteenth the cross section. The result of such substitution, as shown in Fig. 9c, is a typical T-beam section.

In the plate girder, the pitch of the rivets connecting the flange to the web is computed as a function

of the horizontal shear. On the tension side of the concrete beam, this same shear is spread over the surface of all the rods instead of over rivet cross-sections, and is the bond stress.

The horizontal and vertical shearing stresses near the support of any beam have resultants at 45°

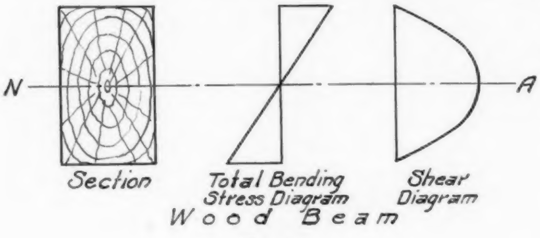


Fig. 6a

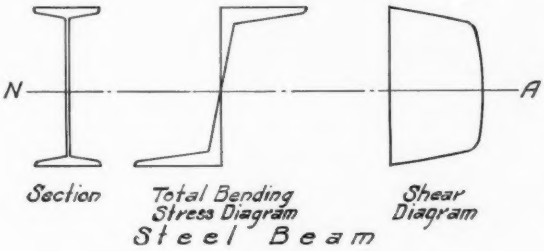


Fig. 6b

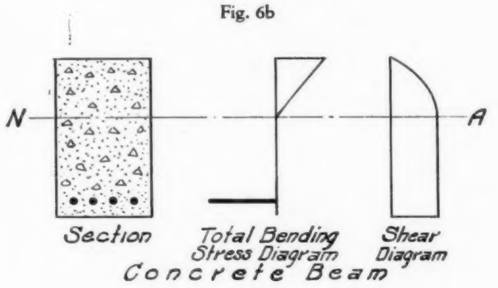


Fig. 6c

with the axis, one tension and the other compression, as shown in Fig. 10. The web of a steel girder is ample in tension but is weak in compression, on account of its slenderness, so stiffener angles are used. The web of a concrete beam is strong in compression, but weak in tension. Stirrups, analogous to stiffener angles, are therefore used. In the cases of both stiffeners and stirrups there are formulæ for computing the spacing, and many designers prefer to use them at a nominal spacing even when computations do not show them to be necessary. It is this diagonal tension in concrete webs which is critical rather than shear, which merely furnishes a measure and a colloquial name for diagonal tension.

Compression reinforcing in beams is not economical, since the steel can take a stress only equal to that in the adjacent concrete multiplied by the ratio of the moduli. There are certain places in which it is commonly used, however. At the supports of T-beams where the flange is on the tension side, it is usually cheaper to continue some of the bottom steel a few feet than to haunch the beam. It sometimes happens, also, that openings close to the side of a T-beam cut into the required flange width. In such a case, using compression steel to make up the difference is a satisfactory solution of the problem.

In rectangular beams the shear is usually low, since the web is full flange width. Since a slab is simply a rectangular beam of relatively great width, its design is usually a matter of moment computations only. Walls are merely slabs set on edge and their design is the same.

Reinforcement in concrete columns changes in length only as the concrete changes, since the two materials adhere rigidly. The stress in the steel is therefore limited to "n" times the concrete stress, as in the case of compression steel in a beam. Reinforcement is usually more expensive per unit of load carried than concrete. Other considerations are involved, however. Most building laws require at least ½ per cent of vertical steel as a factor of safety against stray bending moments, and the item of floor space is important in considering the cost. This will often make economical the use of the maximum allowable amount of steel—up to 5 or 6 per cent. Vertical rods are tied together with separate hoops or enclosed in a spiral cage. The spiral adds to the strength of the column, and an allowance is made for it in design specifications. Rich mixtures, with high allowable stresses, are often used in columns. Considerable study of typical columns is desirable. Various designs must be made, considering different mixtures of concrete, spirals or hooping, percentages of vertical steel and the value of floor space taken by the various sections, in order to arrive at the most economical design for a given case. Concrete columns are round or square in section. In a fire, the corners of a square column spall and tend to reduce the section to circular. Furthermore, circular columns are cheaper when metal can be used. Wall forms must

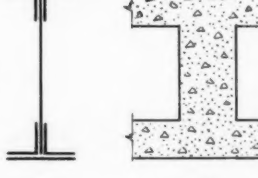


Fig. 8

Fig. 10

Fig. 9

usually remain square or rectangular. Exterior columns, in monolithic construction, must be designed for bending moment as well as direct stress. The designing of a reinforced section for combined bending and direct stress is a somewhat tedious and complicated process.

Ordinary spread footings are designed as two-way slabs. They are relatively short, heavily loaded cantilevers, so that shear and bond are usually the determining features of the design. Occasionally it is best to design footings as continuous beams; in such cases they are rectangular sections, no flange being available. Stirrups are never used in ordinary footings, for construction reasons, and in continuous footings only as a last resort. Miscellaneous structures such as pits, tunnels, machinery supports, etc. can be broken up for purposes of design into slabs, beams and columns. Their designing is a matter of carefully tracing stresses to see that they are all taken care of. This is particularly true in cases where failure to provide for a negative moment might involve cracks, objectionable on account of leakage or for some other reason, even though they are of no importance structurally.

In the detail designing of concrete, that is the economical arrangement of reinforcing rods, there are many considerations both theoretical and practical. In beams, since the inflection point moves somewhat with changing conditions of load, certain zones must be reinforced for both negative and positive moment. Ordinarily, part of the main reinforcing is bent up over the support from each side to take care of the negative moment. These rods, bent at an angle varying from 30° to 45° with the horizontal, also assist in taking the shear. The locations and angles of these bends or cambers must be such that there is sufficient tension steel at each section of the beam.

Stirrups are made in U- or W-shape with hooks at the tops for bond. In massive beams, where more than four legs are needed, it is better practice to use several Us in the same plane as shown in Fig. 11. Stirrups are usually ⅜ or ½ inch, occasionally ⅝ inch. Larger rods do not bend readily.

Spacers,—rods of which the principal function is to hold the main reinforcement in place,—deserve more attention from the designer than they sometimes get. In slabs, using ⅜-inch round rods about 2 feet on center, perpendicular to the main reinforcement, is good practice, and they are commonly used. They serve to distribute the load over the main reinforcing as well as to hold it in place.

Layers of rods in beams are separated by short pieces of 1-inch rod spaced about 50 times the diameter of the main steel, and with at least two under the shortest rod of the top layer. In general, it may be noted that placing concrete is a somewhat vigorous job, and reinforcing bars must be rigidly secured if they are to hold their places during the process.

Splices of reinforcing rods are necessary in certain members. They are never made in beams, but top rods are usually lapped to give sufficient tension steel, and bottom rods as already said are lapped for compression. Column rods are usually spliced every story,—at the floor for interior columns and at the floor or at the top of upstanding spandrels for exterior columns. The practice of butting column rods in a sleeve is largely obsolete, but rods from the lower section, equivalent to the rods in the upper section, should extend above the joint a sufficient distance for bond. Splices in all vertical members should be so arranged that the upper rods can rest directly on a construction joint. Where column rods rest on footings, steel bearing plates are sometimes used. Much more common is the use of stubs, which are rods just long enough to extend the necessary distance for bond above and below the joints. Stubs are also used in other places, such as where the change in column or wall section is too great to satisfactorily offset the lower rods, or where a column or wall rests on a beam.

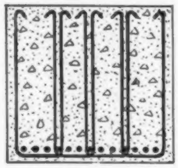
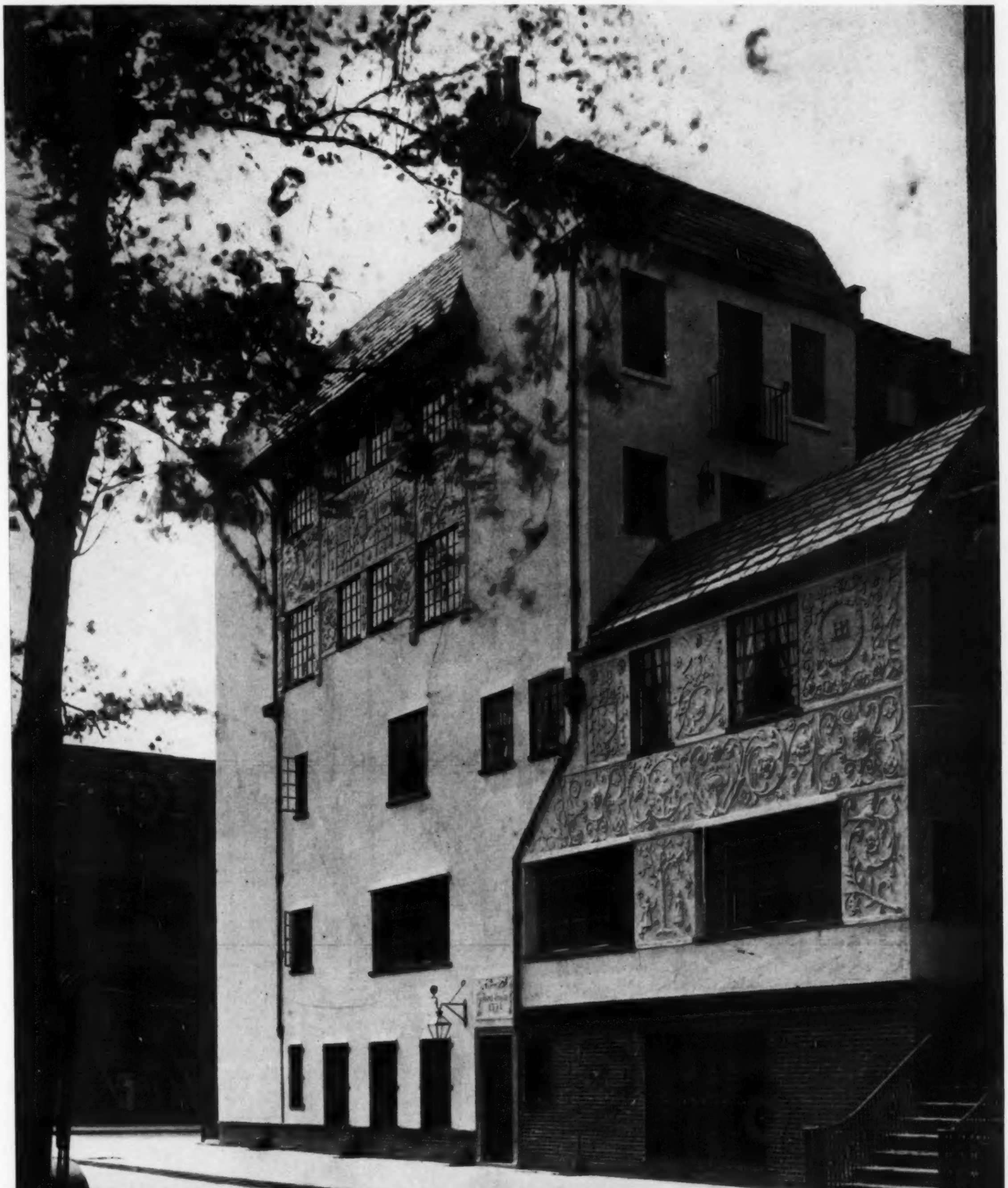


Fig. 11

Detail of large concrete beam showing recommended practice of using several U-shaped stirrups in one plane

Construction joints often need to be looked into, particularly in substructure work where the joints often take considerable shear and where there is danger of leakage. The necessary cover around reinforcing, for fireproofing, is specified in most building laws, but this sometimes needs to be increased where the fire risk is great. Allowance should also be made for irregularities in the placing of reinforcing in such places as large spiraled columns where work of great precision is seldom obtained, and when the amount of cover has been determined upon, definite means should be used to insure just this cover. The practice of laying reinforcing on the forms and hooking it up as the concrete is poured cannot be too strongly condemned. The result is either a floor stronger than was planned structurally, but with almost no protection against fire, or (more often) a floor reduced in strength, sometimes as much as 50 per cent, by cutting down the effective depth.

Most important of all to remember about concrete is that the details "make or break" the design. Allowing the lowest bidder to detail reinforcing as he sees fit is dangerous to the reputation of the architect and often unfair to the better grade of contractor. Furthermore, as the committee of the A. F. of E. S., appointed by Herbert Hoover, says in its report on Waste in Industry: "Not only must the bidder include the cost of the design in his proposal, but he must allow in addition an overhead to cover the cost of similar designs he made for unsuccessful bids. This duplication of design is waste, for which the owner must eventually pay."



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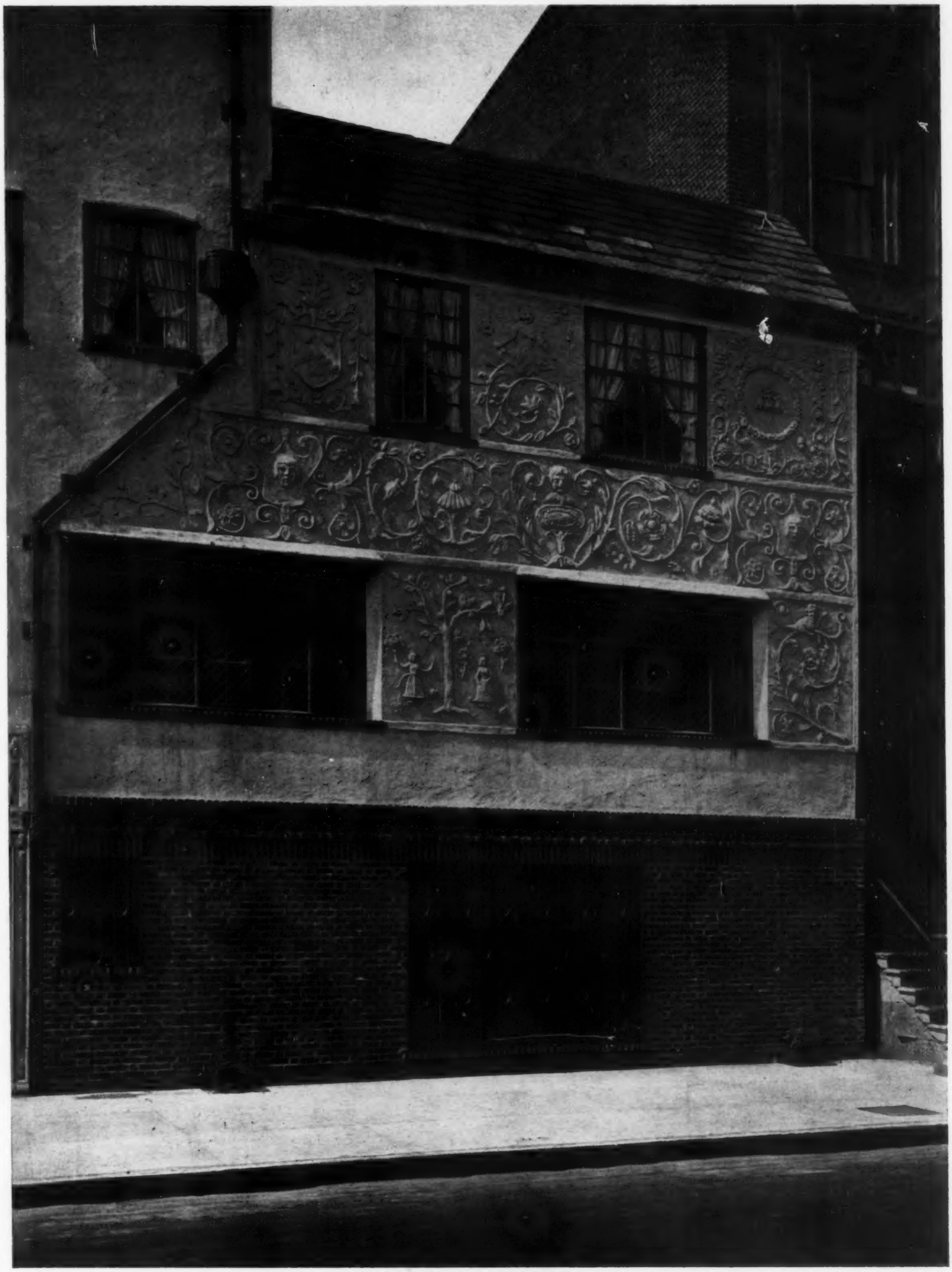

DETAIL OF PARGE WORK

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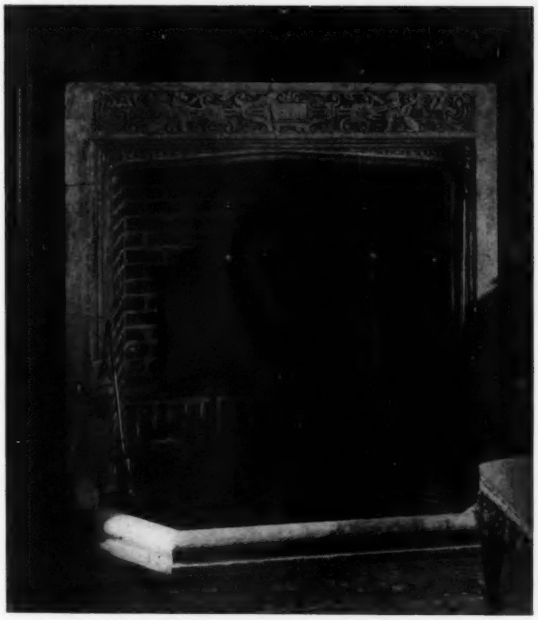
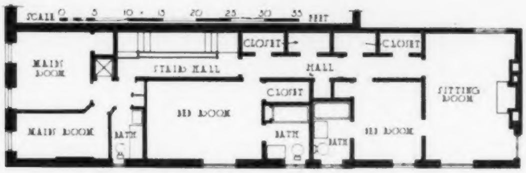
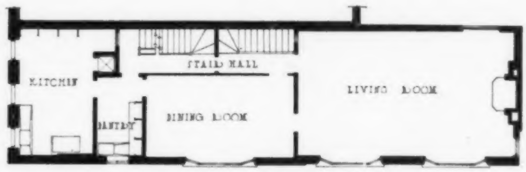
LIVING ROOM



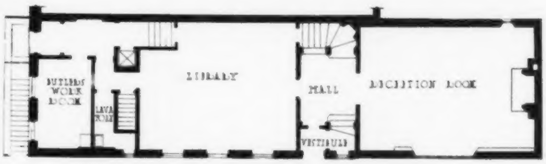
DETAIL OF LIVING ROOM FIREPLACE



SECOND FLOOR PLAN



FIRST FLOOR PLAN



GROUND FLOOR PLAN

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RECEPTION ROOM

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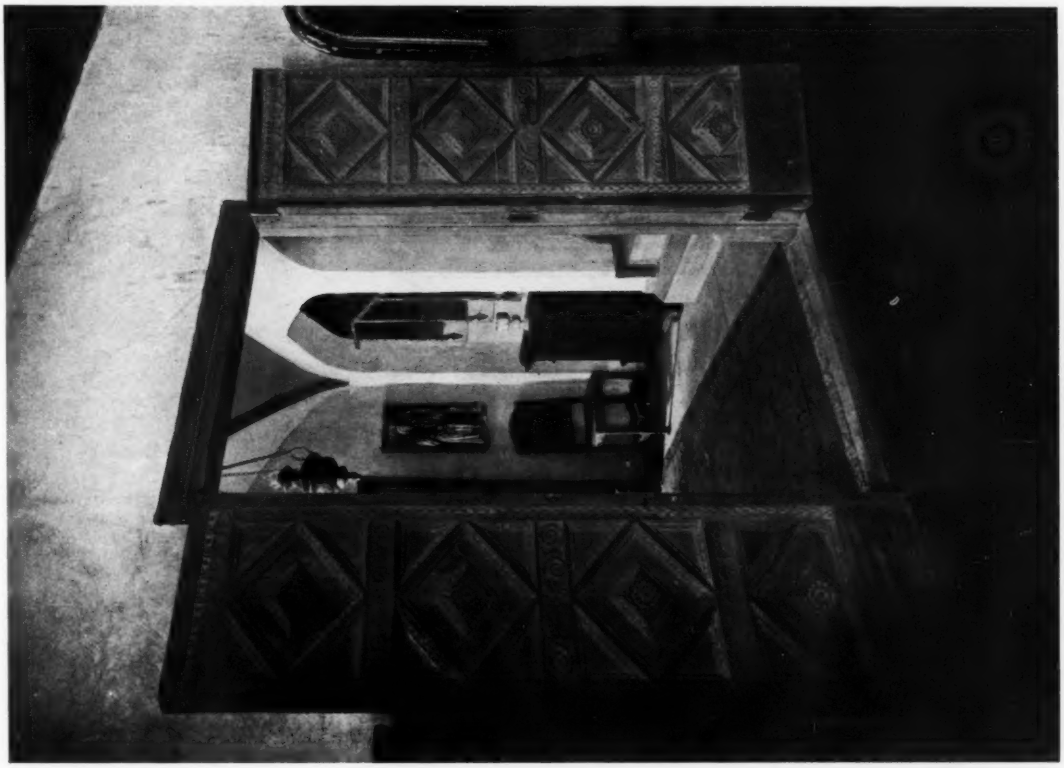
DINING ROOM



RECEPTION ROOM DOORS

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BUSINESS & FINANCE

C. Stanley Taylor, *Associate Editor*

The Co-operative Ownership of Apartment Buildings

II. PROMOTING AND FINANCING CO-OPERATIVE PROJECTS

About two years ago several articles were published in The Architectural Forum on the subject of co-operative ownership. These articles developed an unusual response, indicating the interest of architects in this subject. As the result of the information provided in these articles and in the answers to numerous inquiries several projects of this nature were actually constructed.

The Editors have recently received a number of further inquiries on this subject. In view of this interest and the fact that there have been a number of interesting developments since the original articles were presented, it is proposed to present a series of three articles covering the subject as adequately as possible. The first of these articles was presented in the July, 1922 issue under the heading:

"Methods and Principles of Joint Ownership."

This is the second of these articles. The third (to appear in November) is:

"Recent Examples of Successful Joint Ownership Projects."

Inquiries are invited from architects interested in the development of co-operative apartment buildings, and a special service is offered to readers for suggestions regarding specific problems.

The various problems involved in the promotion and financing of co-operative apartment buildings are naturally complex, because they involve not only the financing problems of any building venture but in addition the formation of a group of tenant-owners. These prospective owners and occupants of the building must be satisfied from every angle that the project will be successful, and a definite ultimate cost must be guaranteed in order to induce the necessary investment.

There are two plans under which all co-operative buildings are promoted. The first is a plan under which a group of tenant-owners, who will occupy approximately 60 per cent of the building space, is formed for the purpose of providing the necessary cash equity. In this type of operation it is proposed that the balance, or 40 per cent, of space shall be rented at rates providing a profit which will cut down the actual cost of occupancy from the viewpoint of the tenant-owners. Experience has shown, however, that the more successful plan is that known as "100 per cent tenant-ownership," in which no rentable space considerations are involved.

The question of actual promotion of this type of building venture is one which we shall treat briefly. The complete functions of the promoter of a co-operative building are:

1. To select a suitable tract of land and place it under option for purchase under a long-term contract.

2. To decide upon the type of building and to have sketch plans drawn which present the project in an understandable and attractive manner.

3. To submit the project to a mortgage loaning source in order to determine approximately the amount of the building and permanent loan which can be obtained on the property.

4. To ascertain the cost and to take contractors' bids (having complete working drawings and specifications prepared for this purpose) in order to determine the exact cost of the building.

5. To organize a holding company, capitalized at the necessary equity which will include all costs of land and building, including the architect's fee, plus the expense of promotion, plus the promoter's profit, which must be kept within a reasonable limit.

6. To offer for sale stock in this holding company arranged in blocks according to the size and cost of each apartment in the building. Ownership of this stock will carry with it a 99-year lease which gives the purchaser the privilege of occupying a specified apartment at a specified owner's rental, which is his share of operating expenses, maintenance cost and any mortgage amortization on the building. The promoter estimates the operating charges and other costs in order to pre-determine this so-called owner's rental.

7. To handle the management of the building after it is constructed and have the accounts of the tenant-owners kept, or to arrange with an efficient real estate management firm or real estate manager to be certain that this work is done properly.

In order to demonstrate the method of presenting a project of this nature to prospective tenant-owners an outline prospectus for such an operation is offered for consideration. This is the prospectus of a new building now being promoted and built by the Joint Ownership Construction Company, Inc., New York, of which Frederic Culver (member of the Consultation Committee of The Architectural Forum) is president.

An analysis of the presentation will provide interesting data.

Financial Plan
955 Lexington Avenue, Inc.
Consideration to be Paid for Land and Building

*Equity represented in stock	$430,000
1st mortgage	265,000
Total cost of operation	$695,000

*Note: $15,000 in cash realized from sale of this stock will be set aside for working capital and surplus fund, and deposited to the credit of the company.

Estimated Operating Expenses of Building

Interest on $265,000 mortgage at 6 per cent (Expect to obtain this loan at 5½ per cent)	$15,900
Insurance	740
Taxes	10,710
Coal	2,475
Operating force	10,080
Water, light and power	2,060
Management	1,395
Supplies	950
Contingency fund	715
	$45,025

Description of Proposed Building

"The building will be a fireproof structure, 11 stories in height and modern to the last degree. It will contain 35 apartments and 13 extra servants' rooms or other utilization of this space on the roof, and can be completed in ten months from the time the foundations are laid, barring strikes or other unavoidable delays. The exterior will be of a Georgian type of architecture, of brick with marble or limestone trim, giving an air of quiet dignity and character to the structure not found in the usual apartment house. The individual suites are planned with a view to light, air, closets, no waste space and elimination of useless ornamentation. There will be an open, wood-burning fireplace in each living room. Changes in the plans can be made if desired to suit the individual needs of the owners, within certain limitations."

The "Culver Plan" of 100 per cent joint ownership, in brief, is thus explained:

"A corporation known as 'No. 955 Lexington Avenue, Inc.,' is formed in which title to the property is vested. The stockholders in this corporation are the occupants of this building. This gives each tenant-owner an interest in the entire property and entitles him to a 99-year lease on the apartment he selects; this lease, together with his stock, gives him virtual ownership of this apartment. Every apartment in the building is sold; there is no space reserved to rent, and therefore speculating in the renting of apartments and carrying vacancies is eliminated, for each individual owner pays his pro-rata share of the operating expenses of the building."

Information as to the organization and financing of co-operative building projects can best be given by concrete examples. We have already presented the outline of a plan for a fairly expensive type of building. We quote here from a letter recently written to an architect by the Service Department of THE FORUM which gives data covering a promotion of an apartment building of less expensive type. The architect in question sent to THE FORUM an inquiry as to how he might proceed in the development of a co-operative apartment building having twelve 4-room apartments, six 5-room apartments, and six 6-room apartments. His estimated cost of land and building together with other details will appear as referred to in our letter in reply:

"Fundamentally, there are two methods which have been found satisfactory in financing such a project. Both of these involve, first, the obtaining of a first mortgage. On your project, which has a total appraised valuation of at least $135,000, it should not be difficult to get a first mortgage of $75,000, details of which we will explain later. This leaves a necessary equity of $60,000 to complete the purchase of land and construction of the building.

"You may proceed in two ways from this point. The first is to enlist the interest of one or two speculative investors who will put up the necessary $60,000, having in mind the sale of this building to a group of tenant-owners (see July, 1922 issue of THE FORUM which contains an article on this subject) at a profit of $15,000 or $20,000; or, second, to sell stock directly to the tenant-owners without bringing in the speculative investor. We will outline here the method of financing without the speculative investor, but if such an investor is brought into the situation and the building is not sold on a co-operative basis, until its construction is completed you would use the same system but add to the cost of the building whatever profit the speculative investor wishes to make.

"Proceeding, therefore, on the assumption that you can directly interest a group of tenant-owners, this is the most efficient procedure: You need $60,000 (or whatever the equity is after obtaining first mortgage) to complete this operation. In addition to this you need some money for promotion expenses in selling the stock and probably also to cover the architect's fee. We should, therefore, immediately incorporate a company having a capital stock of $70,000 in the form of 700 shares at a par value of $100 each—all common, non-assessable stock. This stock should be divided into groups according to the sizes of the various apartments, and the purchase of a block of stock carries with it a perpetual lease or a 99-year lease, at an estimated owner's rental which is paid by the tenant-owner in sufficient sums to cover costs of operating and maintaining the building. For the building which you describe you would have 24 stockholders in about these proportions:

Six stockholders purchasing $3,500 worth of stock each and giving each the tenancy of a 6-room apartment	$21,000
Six stockholders purchasing $3,000 worth of stock each and giving each the tenancy of a 5-room apartment	18,000
Twelve stockholders purchasing $2,500 worth of stock each and giving each the tenancy of a 4-room apartment	30,000

The total amount of money provided in this way is, $69,000 leaving a balance of $1,000 of stock in the treasury.

"If this stock is sold as it probably will be, before the building is started, each stockholder should pay for his block of stock approximately thus:

10 per cent on signing the stock purchase and lease agreement.
15 per cent upon call when you are ready to begin excavation and complete payment on purchase of land.
25 per cent when excavations and foundations are completed.
25 per cent when the roof is on, and the balance when the building is completed. In other words, these payments are made on terms similar to those of a building loan.

"By providing $69,000 in this way you have arranged for the necessary equity of $60,000 and you have a fund of $9,000 to cover promotion expense and the architect's fee. Before stock can be sold it is quite necessary that working drawings and specifications be completed and a lump sum contract be agreed upon so that you can guarantee to these stockholders that they will not be called upon for additional money because of excess building costs. Without this feature the whole scheme is useless.

"The general method of establishing the owner's rental and carrying out the management of the premises is completely outlined in the current issue of THE FORUM (July, 1922) and other details will follow in September and October.

"It has been found unwise to sell stock covering some of the apartments and attempting to rent the others. The successful co-operative apartment house is a complete joint tenancy building.

"The best kind of a first mortgage to get on this building is a loan covering a period of about ten years under an agreement to pay off at the rate of 10 per cent a year. This cost of 10 per cent can be added to the owner's rental or arrangements made to pay off only a part of the mortgage over this period, reducing the amount necessary for the tenant-owners to put up in addition to their first stock investment."

Another interesting method of promoting less expensive building types has been developed by The Queensboro Corporation of New York. This method differs from others described in this article

in that the promoting company employs sufficient capital to complete the buildings before offering tenant-owners stock. We give a description of the method employed by The Queensboro Corporation.

The land is purchased from the land company and an architect is commissioned to draw plans. A building loan and first mortgage is arranged on each building, usually with a bank, trust company or the loaning department of a life insurance company. The buildings are constructed through the purchase of materials and the placing of sub-contracts directly by the owning company. After a building is completed, so that its exact cost is known, the owning company adds its legitimate profit to establish a definite selling price for the entire building. The difference between the first mortgage and this selling price, or in other words the equity amount, becomes the amount of capitalization of a co-operative tenants' corporation which is to own this individual building and which is limited by the terms of its charter to the ownership, maintenance and improvement of a specific plot of ground and the building thereon. This provision is made to prevent any chance of speculation with the corporation's money.

Having in this manner incorporated the equity in the building, stock is offered for sale to prospective tenants. The amount of stock purchasable depends on the number of rooms contained in the apartment which the tenant proposes to occupy. Under this plan all apartments are occupied by stockholders. There is a considerable difference at this point, however, between the principles of this operation and those of the average co-operative development. In the first place, the ownership of stock involves only a right to occupancy of the specific apartment on yearly lease by the *original purchaser*. This lease is renewable annually as long as the stockholder wishes to occupy the apartment.

Details of a Typical Investment

In order to demonstrate clearly the exact financial operation of this transaction we give a complete financial outline of a typical purchase in any one of these buildings. The transaction is thus described: A conservative first mortgage has been placed on the building, averaging approximately $800 per room. A purchaser of a typical 5-room apartment pays approximately $10,500 on an easy-payment basis. Of this amount, at the rate of $800 a room, $4,000 is in the form of a first mortgage, leaving an equity of $6,500 which he must pay. He is called upon to provide only $2,000 in cash, leaving an unpaid contract balance of $4,500.

The tabulation here shows how this $4,500 is paid off. It will be noted that the monthly payment of $134 is fair market value for an apartment of this class, but out of this amount $35 is directly credited as an installment payment, and the dividends out of the monthly rental of $99 are credited to the account of the tenant-owner. Thus in the fourth month of the seventh year, after paying a normal rental over this period and enjoying all community advantages, he is the owner of a valuable equity.

Equity	$6,500	Monthly rental	$99
Cash	2,000	" installment	35
Contract	$4,500	Total monthly	$134

With an initial cash payment of $2,000, monthly rental of $99 and monthly installment of $35 on contract, and crediting the estimated dividends on the equity at 7 per cent, the entire stock equity will be paid in six years and four months.

Year	Installments		Estimated dividend @7 per cent		Gross credit		Interest (deduct from gross credit)		Net credit	Total credit on contract end of each year
1st	$420	+	$455	=	$875	–	$270	=	$605	$605
2nd	420	+	455	=	875	–	234	=	641	1,246
3rd	420	+	455	=	875	–	195	=	680	1,926
4th	420	+	455	=	875	–	154	=	721	2,647
5th	420	+	455	=	875	–	111	=	764	3,411
6th	420	+	455	=	875	–	66	=	809	4,220
4 mos. of 7th	140	+	152	=	292	–	5	=	287	4,507

These credits, with the $2,000 initial payment, will pay in full the stock equity of $6,500. After the equity is paid, monthly cost is:

Rental	$99.00
Dividend (estimated at 7 per cent)	37.92
Net monthly cost	$61.08

A feature of this plan is an agreement whereby all stock purchased is held by the original owning company for a period of five years. This obviates the necessity of placing a second mortgage on the property, and as this owning company (as later explained) has a contract to manage the property, it is evident that if it does not so manage that the dividend is 7 per cent, as estimated, it in turn must have its money tied up over a longer period.

All apartments are occupied by stockholders, with the provision that if a stockholder finds it necessary to move he may give notice in July and vacate the apartment October 1 of any year. He is no longer liable for the rental, and while he still maintains his stock ownership and receives dividends accordingly, the apartment is actually rented to a tenant by the owners' corporation, of which his stock ownership is a part. Conversely, stock ownership other than the original purchase does not carry with it a right to occupy an apartment. The stock owner may sell his stock to whom he pleases at any price he can get, but the new purchaser of the stock must receive the approval of the owners' committee before he can personally occupy the apartment in question.

When the stock of an individual building has been sold the title to the land and building passes to a company composed of the tenants. The Queensboro Corporation makes a contract to manage the building for a period of ten years with an option on the part of the tenant-owners to renew for a like period. As this organization has had extensive experience in management and has large purchasing power it is quite evident that such management

will be more efficient than an amateur attempt at building management by a committee of tenants.

As already explained, the basic elements of co-operative building ownership do not preclude the application of this principle to moderate cost buildings, excepting in the limitation of promoters' fees. In fact it might be said that as the inducement to the promoter is greater in developing high cost buildings it is but natural that activity should be directed chiefly toward expensive apartment dwellings. There is, however, a great need of studied application of the co-operative principle in the development of apartment units costing in gross figures not over $8,000 per family. In order to give some idea how a comparatively inexpensive co-operative project can be developed, it may be interesting to know of a simple development of this nature which is now being successfully carried out, insofar as the financing is concerned, and which promises to be successful from the tenants' point of view.

For the development of the operation in question it was first determined that in a rapidly growing industrial city there were a number of families who would be interested in buying apartments on the co-operative plan, provided the cash payment were not too high. It was further learned that as far as a building loan was concerned co-operation might be expected either from a financing corporation, definitely developed to aid in meeting the housing shortage, or from an insurance company which had set aside a certain amount of money to assist in solving the housing problem. The first step was to work out sketch plans and to outline specifications for an apartment building simple in design and equipped and planned to include every possible economy, but at the same time providing comfortable dwelling quarters for a class of people represented by the employes of local factories. Having determined that the elements of financing and demand could be definitely counted upon, the advancing of the necessary equity was undertaken by a group of men interested in meeting the local housing shortage.

The general figures on this project were worked out somewhat in this manner:

1. That a building should be constructed providing ten apartments averaging 6 rooms each at a cost of $6,500 per family, consequently making the total cost of the building $65,000. The building in question is a 4-story, walk-up apartment having simple modern conveniences.

2. That land suitable for the location of this building should be obtained for $5,000.

3. That a mortgage loan, bearing an amortization clause as later described, could be obtained, amounting to 60 per cent of the cost of land and building or 60 per cent of $70,000, being a building and first mortgage loan of $42,000, 20 per cent of which was to be paid off over a period of five years. This meant in simple figures that, adding a profit of $500 per family for those who financed the equity in this building, each apartment might be put on the market for purchase at $7,500 made up as:

Pro rata cost of building	$6,500
Pro rata cost of land	500
Pro rata allowance for profit	500
	$7,500

Of this amount the advancement of $4,200 as part of the building loan was assured, leaving an actual cost balance of the difference between $7,000 and $4,200, or $2,800 per family, this being the amount of equity advanced by the promoting group.

Having completed the details of the operation thus far a stock company was formed representing the equity in the sales price of the building,—the sales price as given being $75,000; the first mortgage being $42,000, and the original owners having agreed to allow a second mortgage of $15,000, to be paid off on an amortization plan by those who purchased stock carrying occupancy privileges in the building.

From the viewpoint of the buyer, therefore, an apartment in this building could be purchased for the gross price of $7,500 of which $4,200 represented a pro rata share in the first mortgage, and $1,500 represented a pro rata share in the second mortgage, which is to be paid off in five years. Taking this total of $5,700, it is found that the purchaser of an apartment must pay $1,800 in cash for which he receives one-tenth of the stock of the corporation, carrying with it the perpetual leasehold privileges for one apartment. Having paid $1,800, the tenant has assumed these liabilities which might be termed owner's annual rental:

Interest on first mortgage of $4,200 at 6 per cent	$252
Interest on second mortgage of $1,500 at 6 per cent	90
Amortization of 20 per cent of first mortgage over five years, or 20 per cent of $840	168
Amortization of second mortgage over five years	300
Pro rata cost of maintenance and service charges	300
	$1,110

In this total of $1,110 the items of $168 and $300, representing amortization payments, cannot be figured as actual rental, but are really installments on the purchase of the apartment and consequently represent savings. Therefore, the actual rental of the apartments approximates $642, or about $54 a month, which is actually decreased by the cessation of interest on the amortization payments until, at the end of five years, the owner of one-tenth of the stock, representing the tenancy of one apartment, actually pays as a rental charge:

Interest on reduced first mortgage, $3,360 at 6 per cent	$201.60
Second mortgage has been paid off	
Cost of maintenance and service charges	300.00
Owner's rental, after fifth year	$501.60

or approximately $40 per month, to which must be added any repairs which the owner may wish to make to his own apartment, as the owner always assumes costs of interior repairs and decoration in the co-operative plan.

No item is included, of course, as interest on money invested, as this interest is returned in the form of reduced rental cost.

Professional Bills and Accounts

By TYLER STEWART ROGERS
The Housing Company, Boston

ONE of the most important administrative details which is performed in the office of any business concern is the preparation of bills in payment for services rendered or goods sold. This one operation, though seemingly perfectly simple, is worthy of careful study, for it contains many pitfalls and dangers that threaten to steal away legitimate profits.

In commercial transactions the process is relatively simple, for generally there is a price fixed and known in advance to both parties which forms the basis of the charges billed. In professional work, however, such as that performed by architects, landscape architects or engineers, where the charges are frequently based upon the extent of service and only the rate of charge is known in advance, there are complications which require straight thinking to unravel. For purposes of this discussion let us represent all professional offices by a typical architect's office, for the underlying principles remain the same in all the various allied professions.

Theoretically, an architect conducts an office only when required to do so for the benefit of a client, in order to express by the medium of plans and writings his conception of the structure which the client desires. The client pays the architect for his concept and the supervision of its realization. In addition he pays the cost of the means necessary to arrive at the realization, either to the architect for the services of his organization, or to the contractor. Were it economical to do so the client might employ the architect for his "personal" professional services and have him prepare all the necessary plans and specifications by his own hand. However, it has been found less expensive for the architect to employ assistants to perform most of the actual preparation of the drawings, and for this reason only offices are established. Thus the draftsmen, specification writers and clerks, and the office furniture and equipment are all means to an end, and are solely for the benefit of the client. Consequently, the client must pay for these things as elements of cost in the accomplishment of his project. When several clients engage the same architect, he, still for purposes of economy, performs all his work in one office and divides the cost of this office among his clients in próportion to the amount of work he does for each; it is the process of determining and properly allotting expenses that constitutes the principal operation in the preparation of bills.

Expenses incurred in the conduct of an office may be divided into two major groups, labor constituting the first, and equipment including materials or supplies, the second. In order to properly account costs it is essential that these two groups be kept separate at all times during calculations. Each group of expenses may be separated into two other divisions, depending on whether the expense was incurred for the benefit of only one client or project or for the benefit of two or more; the first class would be called direct expenses and the second, indirect expenses.

We have now formed four groups, which together include all possible expense items. They are:

1. *Direct Labor Expense.* Time cards kept by the architect's assistants show the amount of time actually spent on each project in the office. The total of this time is the productive labor for the period under consideration. The cost of this time (all of which is divided apportionably among the various projects according to the time cards) constitutes the direct labor expense.

2. *Indirect Labor Expense.* The balance of the payroll which remains after deducting the cost of all direct labor expense constitutes the indirect labor expense. Examination will show that this balance was incurred for the benefit of several clients or all of the clients and hence its cost must be apportioned among the projects in proportion to the benefits derived therefrom by each. Typical expenses of this class are:

(*a*) Waiting time of draftsmen; that is, time not applied to active projects, due to lack of information, delays or lack of work.

(*b*) Vacation time, sickness or absence for any cause during which time the absentee is paid, yet which produces no benefits; some offices do not pay for such lost time.

(*c*) Labor given to general office work, such as stenography, filing, charting, cleaning up and other customary administrative work.

It will be noted that the first two groups are non-productive, while the third is productive labor. In order to assist in obtaining economical management it is often desirable to follow these costs separately, hence indirect labor expenses are sometimes subdivided into non-productive indirect labor and productive indirect labor.

3. *Direct Equipment and Materials Expense.* This group includes the cost of telegrams and long distance telephone calls, blueprints, photographs, models and other items purchased for the benefit of individual clients. Any expense item, to be included in this group, must be wholly chargeable to a single project.

4. *Indirect Equipment and Materials Expense.* This group takes care of all expense items not classified in one of the other three groups. It includes all items excepting labor items which, in the parlance of the accountant, have more than one beneficiary. Some of the typical expenses belonging here are:

(*a*) Rent, or its equivalent in replacement reserve

and insurance on building, and interest and taxes on investment in building and realty.

(*b*) Heat, janitor service, and building repairs if not included in (*a*).

(*c*) Equipment expenses such as replacement reserve, interest on investment in equipment, and insurance and taxes on equipment.

(*d*) Service expenses, such as electric lights, lamp replacement, towel and soap supplies, water coolers or filters, and drinking cups.

(*e*) Telephone service, excluding long distance calls chargeable to separate projects.

(*f*) Administrative expenses, including stationery and office supplies, postage, bad accounts and collections, federal and corporation taxes if any, dues to professional organizations, and miscellaneous (not direct) traveling expenses.

(*g*) Selling expenses, depending on the scope of sales operations as such, including advertising, sales traveling expenses, sales letters, and publications.

(*h*) Compensation insurance on employes, bonuses apart from wages, etc.

Excepting for administrative purposes these subgroups are all thrown together under the one general head. The terminology applied to the four main classes is descriptive rather than popular, for the use of the common terms such as "burden" or "overhead" would tend to confuse the discussion because of their ambiguity.

It is not within the province of this discussion to consider in detail the actual bookkeeping methods used to keep track of these costs. Suffice it to say that a method which clearly recognizes the four main classes of expenses will be the simplest of application in the long run and will make it possible to avoid many mistakes which are fatally easy to make.

Having collected the many expense items for the period to be billed, the process of sorting out and apportioning them begins. The direct expenses, of both labor and equipment, are readily separated and assigned. The problem comes in the distribution of the indirect expenses. The basis for distribution of indirect expenses is "in proportion to the amount of work done for each client," to repeat our own words. The amount of work done for each client is expressed in the number of productive man-hours expended on each project. Hence, *for each job, the ratio which the number of productive man-hours expended bears to the total number of productive man-hours* (expressed in per cent) *is the ratio in which all indirect expenses are apportioned* to the job. This is our basic theorem.

It is essential to apportion indirect labor expenses separately from indirect equipment and materials expenses, for otherwise the burden would be "pyramided," with the result that the distribution would be incorrect and incomplete, as illustrated farther on.

Following out this procedure, the direct labor is first set up against each project. Then the indirect labor is distributed as just described. The direct equipment and materials expense is then allocated, and finally the indirect equipment and materials expense is computed and placed. These four items added together make up the total cost of the work for each client. To this total is added whatever fee charge is due in accordance with the contract governing the case. It may appear that such steps are unnecessarily involved for actual practice, and that short cuts may be made by grouping the items together in some way. That such economies are unsound is best illustrated by examining the results obtained by other systems which do combine them.

The time honored method of taking care of "overhead," the system in use in the vast majority of offices today, expresses the total indirect expenses as a percentage of the payroll. That is, the indirect expenses are all added together and compared with the professional payroll, and the relation between the two is expressed as a percentage of the payroll. The payroll is distributed among the jobs as before, and to each job payroll is added the percentage thus found in dollars, which is called the "overhead" cost. Some offices, since their first beginnings, have religiously and blindly added 100 per cent to their payrolls to cover "overhead," regardless of whether this is ample or just.

Now suppose two jobs, widely different in character, enter such an office. The first is mere tracing and is assigned to a tracer who is paid $10 per week. The work lasts a week and the client is billed $10 for labor, plus $10 for overhead, plus whatever profit is made. Frequently, by the way, the profit too is computed as a percentage of the payroll cost. The other job requires the best skill available and is assigned to a man drawing $100 a week. This work also lasts one week and is billed to the client at $100 for labor, $100 for overhead, and a profit charge. During that week both the draftsman and the tracer occupy about the same amount of room and use the same amount of light, water, heat, towel and soap service and the other things which make up the indirect expenses for the period. Both work while a third man is on vacation and therefore bear the burdens generally supported by his work. But one man turns in $10 and the other $100 as his contribution to the total indirect costs or "overhead."

Were this sort of work to continue over long periods the dangers of the system would become quite obvious, especially if the work were mostly for the low priced man. The office would go bankrupt unless it raised its "overhead" charge to 200 or 300 per cent or more in order to return an amount sufficient to cover expenses. Furthermore, this plan makes the work done by cheap labor cost the client less, and that done by skilled labor more than the true cost, thus putting a premium on the better class of work.

A second example is well worth following, as it brings out other fallacies. In the same office circumstances compel idleness for a part of the force so that the productive time is but a fraction of the total. Let us assume that there are 1,000 man-hours in the period and that only 600 hours are

productive. Then let us suppose the total indirect equipment and materials expense to be $1,000, and the labor cost uniformly $1 per hour. Following the practice last described, the "overhead" would be computed at 100 per cent, for both the payroll and the indirect equipment and materials expense are $1,000 each. Three jobs are in the office; A using 250 hours, B using 200 hours, and C using 150 hours, totaling 600 productive hours. The bills would be thus computed, exclusive of profit and direct equipment expenses:

Client	Direct labor cost	Overhead cost	Total
A	$250	$250	$500
B	200	200	400
C	150	150	300
	$600	$600	$1,200

This leaves $800 unaccounted for, and too often the loss goes unnoticed. If noted, the architect might add the $400 of unproductive labor to the burden, making it $1,400, and then he would compute his bills again, using 140 per cent as his overhead charge, after this manner:

Client	Direct labor cost	Overhead cost	Total
A	$250	$350	$600
B	200	280	480
C	150	210	360
	$600	$840	$1,440

Again it is seen that the total is short $560 of the $2,000 which represents the total office expenses. Now if we follow the steps recommended in this discussion the calculations would be as given below. Note that for the sake of simplicity no direct equipment and materials expenses are considered.

Client	Direct labor cost	Indirect labor cost	Indirect equipment costs	Total
A	$250.00	$166.67	$416.67	$833.34
B	200.00	133.33	333.33	666.66
C	150.00	100.00	250.00	500.00
	$600.00	$400.00	$1,000.00	$2,000.00

At last we have arrived at a complete distribution of costs. The example chosen is exceedingly simple, owing to the condition of a uniform labor cost. The complete operation of the plan is more correctly conceived if we consider also the variation due to the difference in the cost of labor employed on each job. Let us assume that our 600 man-hours comprised the time of three men, one getting $1.50 per hour, another $1 per hour, and the third 50 cents per hour. Also assume that the cheapest man worked on job A, the dollar man on B, and the high-priced man on C. Under these conditions, the cost of the productive labor will amount to $550, and the unproductive to $450. Here is the situation in tabular form:

Client	Labor rate	Productive hours	Direct labor cost	Indirect labor cost	Indirect equipment and materials cost	Total
A	$0.50	250	$125.00	$187.50	$416.67	$729.17
B	1.00	200	200.00	150.00	333.33	683.33
C	1.50	150	225.00	112.50	250.00	587.50
		600	$550.00	$450.00	$1,000.00	$2,000.00

Here again we have distributed our total expenses, amounting as before to $2,000. But we have applied our indirect expense items in proportion to the amount of work done for each client, and not on the false basis of the labor cost of this work. The time element which enters into rent, light, insurance and such factors in the indirect equipment expenses is here recognized and used as the basis for apportioning those costs.

It is apparent from the first two examples that pyramiding burden charges is disastrous. It is of the utmost importance to check all calculations to make sure that all expense items are distributed. For this reason it is essential that a control ledger be incorporated as a part of the bookkeeping system. It may be in the form of a simple debit and credit ledger, showing all disbursements made and all credits received, during each invoice period. It would be convenient to have this ledger divided into four columns and a total, one column taking care of each of the four major divisions of expense. Then, when all bills are computed, their total expense items should equal the total disbursements of the control account, less any proper credits. Also the analysis of the expense items in the control ledger should balance with the same analysis of the bills. A form of proof sheet is given upon this page.

Conditions may arise where two or three projects, but not all *active* projects, benefit by certain expenditures. Under the general rules given these expenses are indirect. In order to distribute them equitably to the proper beneficiaries, and to avoid making them a burden upon the projects not concerned, it is necessary to set up supplementary classifications in addition to the four main classes of expenses. Thus jobs A, B, and F may be associated

PROOF SHEET

PROJECT	DIRECT LABOR	INDIRECT LABOR	DIRECT EQUIPMENT AND MATERIALS	INDIRECT EQUIPMENT & MATERIALS	TOTAL
TOTALS					
CONTROL LEDGER TOTALS					

Suggested Form for Analysis of Expense Items in Control Ledger

together in such a way that they should bear the full cost of a model that is made, while jobs C, D and E are not benefited by the model. In that case the cost of this item is thrown into "supplementary indirect equipment and materials account No. 1." Similarly, other supplementary accounts are opened as required. At the time of distributing costs these accounts are analyzed and the expenses allotted in proportion to the benefits accruing to each project in the group. The special circumstances of each case will determine an equitable apportionment.

If vacations are granted with pay it may happen that a client whose work is being done during the vacation season will be required to bear a greater proportion of this indirect labor expense than would a client whose work is done during the winter months. When this condition becomes important the cost of all vacation and holiday time for the year should be computed and set apart in a separate account, and one-twelfth of this total distributed each month as an item of the total indirect labor expenses.

Another method is to compute the number of working days in the year, or better still the number of working hours, and compare that total with the number of hours of holiday time which will be paid for. This will include the two weeks' annual vacation and all legal holidays. The ratio between the holiday time and the total holiday and working time, expressed in per cent, is then used to compute the indirect labor cost for this item by taking that per cent of the direct labor cost and applying it to each project. The funds thus derived monthly must be set aside and used for vacation pay, and thereafter no holiday time should be distributed directly for the period during which it occurs.

If sickness time is paid, it is best to distribute it during the current period as it is a very variable item. Long established offices may have records of sickness time which will be adequate guides for computing an allowance for such absence in the manner described for holidays, thus making all projects bear these labor expenses equally over a whole year. Some offices do not consider sickness time as a proper charge against any client, on the ground that it is a form of bonus to the draftsman in order to retain his good will. Nevertheless, the client must ultimately pay, either as overhead or in a higher fee charge, so it is better not to disguise this payment. The question is really whether any sickness or holiday time should be paid at all, and that is a matter for the architect to settle as a policy. The client, in retaining the architect, obviously agrees to his policies of management.

The method of computing bills described up to this point applies directly to all projects which are handled under any form of cost-plus-fee agreement. The costs are derived and clearly set forth, and the fee is added in accordance with prearranged terms. When professional work is taken for a lump-sum fee, including office costs, or when the professional fee is determined by the cost of construction, these computations merely become means of finding costs. Inasmuch as the ultimate profit depends on the difference between the fee received and the actual complete cost of the design, a cost-finding method of this kind is essential to proper management. Under the latter types of contract the methods of billing are defined in the agreement.

The presentation of bills based upon carefully analyzed costs can have no effect in the long run other than the establishment of a reputation for business ability and fairness. The architect should be able to open his books to his client at any time and show him a detailed analysis of the bills he has rendered. This can be done safely only when the computations are based on recorded facts. Systems which do not balance periodically, or which have no check, are subject to adjustments and vague charges which cannot be explained satisfactorily to a keen business man. Analysis of design costs as provided for in this method of keeping records will quickly show the architect whether his management is economical or otherwise. In these days of sharp competition it is highly desirable to cut down to a minimum the various "overhead" costs. Monthly comparisons between the direct labor and the total indirect expenses charged to all jobs will provide a ready guide as to the trend of the office in this respect.

While it may be unethical to cut professional fee charges in order to eliminate competition, it can never be said that it is improper to reduce waste in order to meet competition. An office which is conducted in strict accordance with the best interests of its clients will be able to obtain work because the clients will feel that they are not wasting money on slipshod management. On cost-plus contracts, such an office clearly can undersell its unprogressive competitors even though taking the work on their own terms. On lump-sum or percentage contracts the fee charge may be lower than most competitors' and yet the profit be the same. A reputation for economy and good management should be earnestly sought and jealously guarded.

This system of analyzing costs has been used for some time in the office with which the writer is associated. The installation of the system proved to be simple, for it was found that standard accounting forms could be used with only slight changes. The classification of accounts previously in use was modified so that the four major groups of expenses were brought together under distinguishing index numbers. A control of each group was thus established against which the ultimate distribution of expenses to clients could be accurately checked.

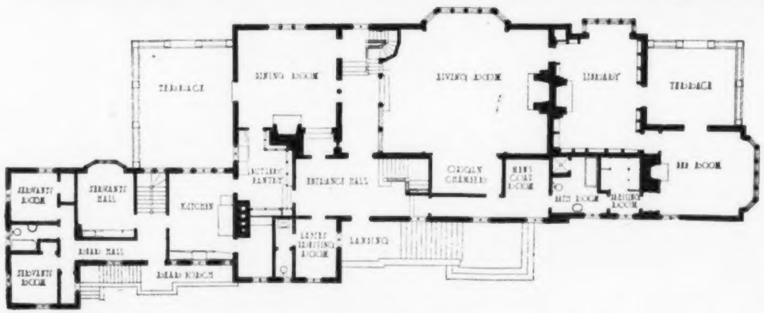
Perhaps the greatest value derived from this sort of analysis of expenditures is due to the fact that it accurately allocates costs to projects and departments. It has proved an unexpected aid in efficiently administering the office. It has brought to light many possible economies, has helped to eliminate waste, and has been helpful in maintaining a low and relatively uniform ratio.

DETAIL OF GARDEN FRONT

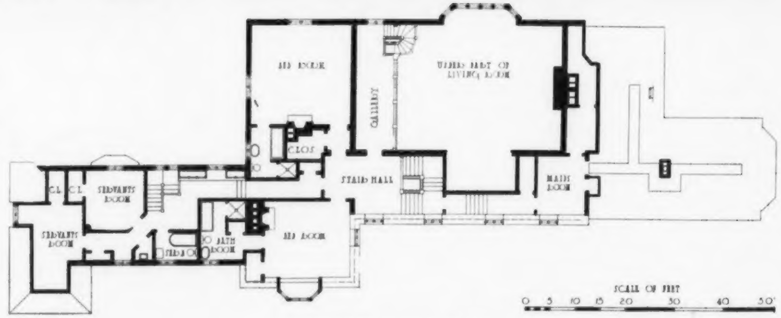
HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS

GENERAL VIEW OF ENTRANCE FRONT



FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS

DETAIL OF LIVING ROOM BAY

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS

LIVING ROOM, LOOKING TOWARD GALLERY

DETAIL OF STAIR ENCLOSURE

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

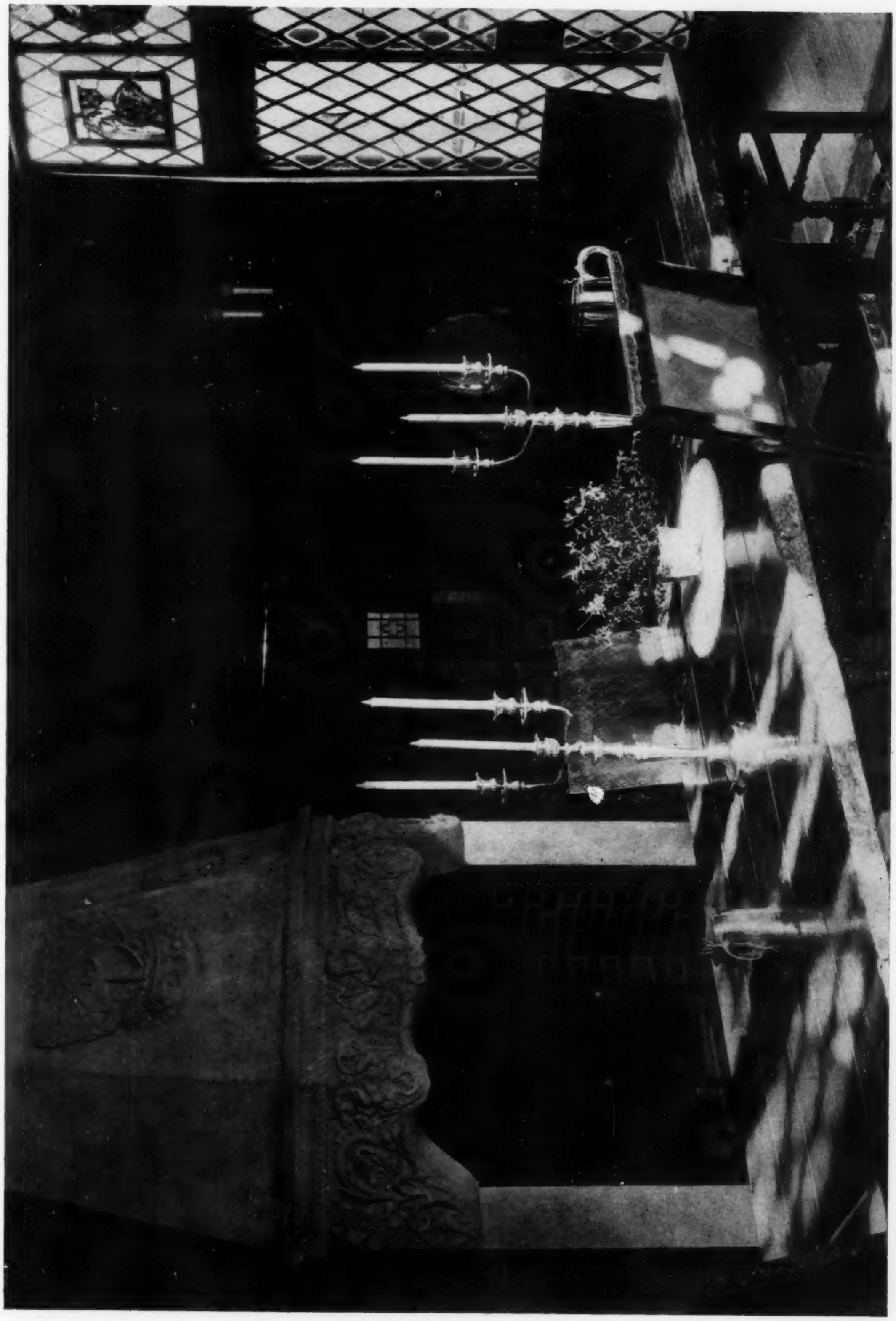
BAKEWELL & BROWN, ARCHITECTS

LIBRARY

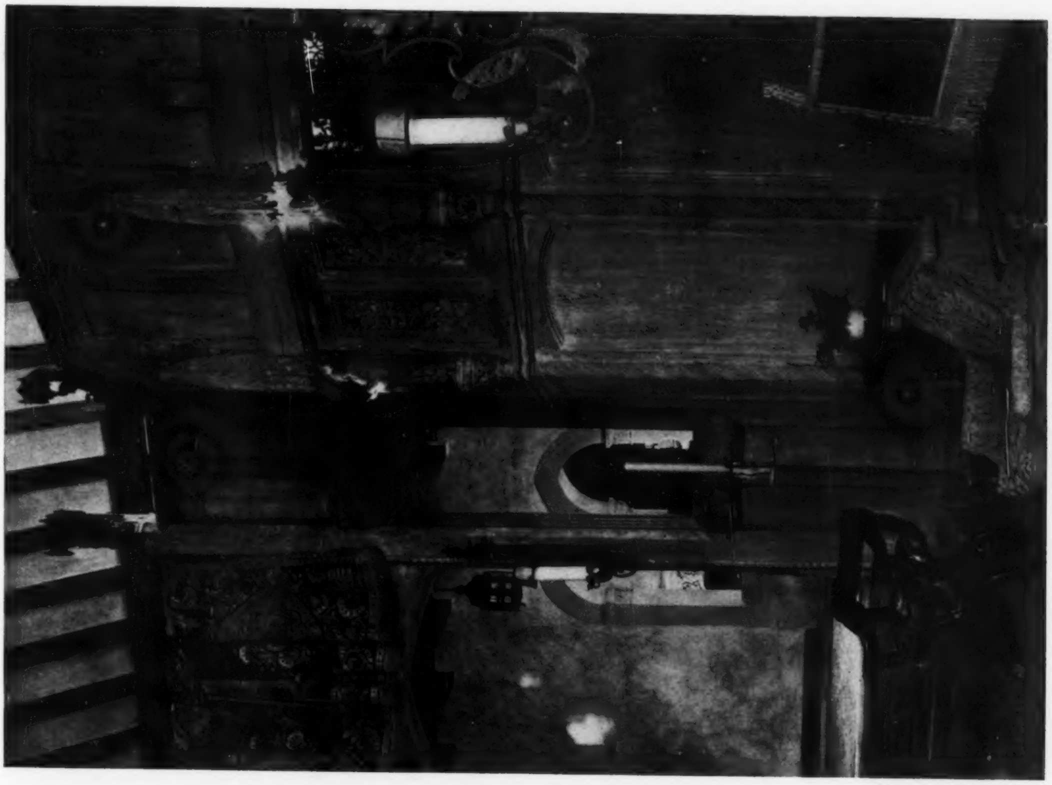
FIREPLACE END OF LIVING ROOM

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS



DINING ROOM
HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.
BAKEWELL & BROWN, ARCHITECTS



DETAIL OF GALLERY

DETAIL IN DINING ROOM

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS

GRANADA THEATER, SAN FRANCISCO

ALFRED HENRY JACOBS, ARCHITECT

AUDITORIUM

CALIFORNIA THEATER, SAN FRANCISCO

ALFRED HENRY JACOBS, ARCHITECT

FIRST CHURCH OF CHRIST, SCIENTIST, MERIDEN, CONN.

ORR & del GRELLA, ARCHITECTS; LORENZO HAMILTON, ASSOCIATED

VIEW OF AUDITORIUM

DETAIL OF ENTRANCE LOGGIA

FIRST CHURCH OF CHRIST, SCIENTIST, MERIDEN, CONN.

ORR & del GRELLA, ARCHITECTS; LORENZO HAMILTON, ASSOCIATED

Two San Francisco Motion Picture Theaters

ALFRED HENRY JACOBS, ARCHITECT

THE growing use of Spanish motifs in architecture and decoration, identified as they are with the early history of the settlement of the region, finds constant expression in California. The architectural types involved, in certain of their aspects, adapt well for large and semi-public buildings which are intended for purposes which demand a certain effect of splendor. The Spanish renaissance style possesses a florid richness which renders it particularly suited for such use; the Spanish Gothic style is not often employed excepting for churches or other ecclesiastical or collegiate structures, though like the Spanish renaissance type it abounds in advantages when there is necessity for using a style which lends itself readily to work large in size as well as in scale and for which an appearance of magnificence is considered desirable. In these styles, therefore, have been planned two recent motion picture theaters in San Francisco, the Granada Theater, planned in a modified form of the Spanish renaissance, and the California Theater in a modified Gothic style which has been given a

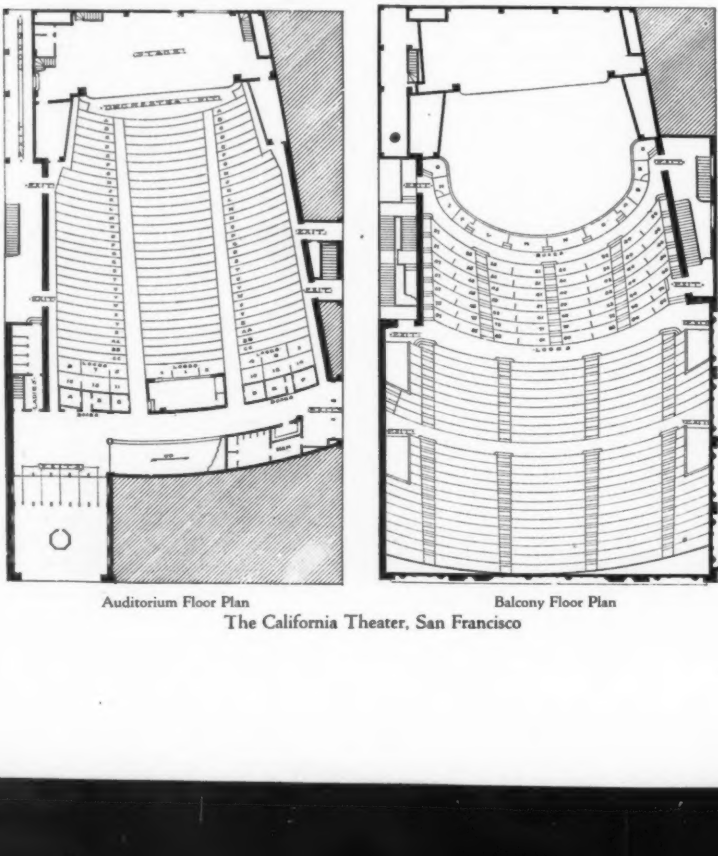
The California Theater, San Francisco
Alfred Henry Jacobs, Architect

Plaisance on Balcony Level, the California Theater, San Francisco

slightly Spanish character with modified detail.

In the Granada Theater, which is considerably the larger of the two, a successful use has been made of terra cotta, a material which is readily worked and which adapts easily to the bold and luxuriant forms which are characteristic of the renaissance work in Spain. Here the terra cotta is colored in orange, tending somewhat to red and slightly grayed. The domes which cap the two towers at the front are covered with vari-colored tile which enhance the Spanish character, and the most striking detail of the facade is a great window which has been worked out in metal of a brilliant green with ornamentation of gold leaf.

The floor plans show the disposition which has been made of the theater proper, occupying the space at the rear of the plot and leaving the street frontage available for the main entrance with its vestibule and foyer and for shops which face the different streets upon which the property fronts. The theater itself is planned in the form which experience has proved to be most suitable for houses designed for the showing of motion pictures—an auditorium somewhat deep for its width, since motion pictures should be viewed as nearly as possible from the front rather than from the side. The absence of boxes at either side of the proscenium arch is in accordance with present custom in motion picture theaters, and indeed in theaters of any sort, and beyond the orchestra space, in which is placed the console for the pipe organ, is set the shallow stage which is all that is required in a theater of this kind; the shallowness of the stage has, in fact, made possible the unusual



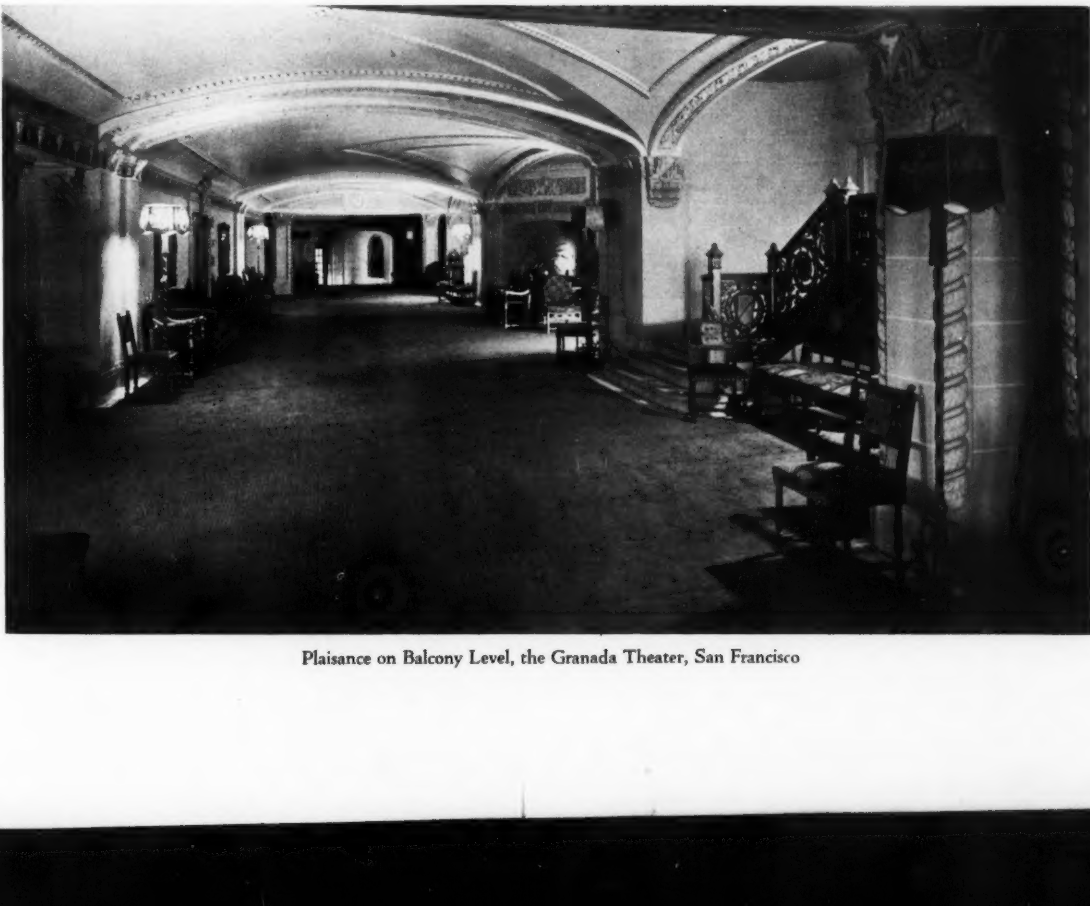
Auditorium Floor Plan Balcony Floor Plan

The California Theater, San Francisco

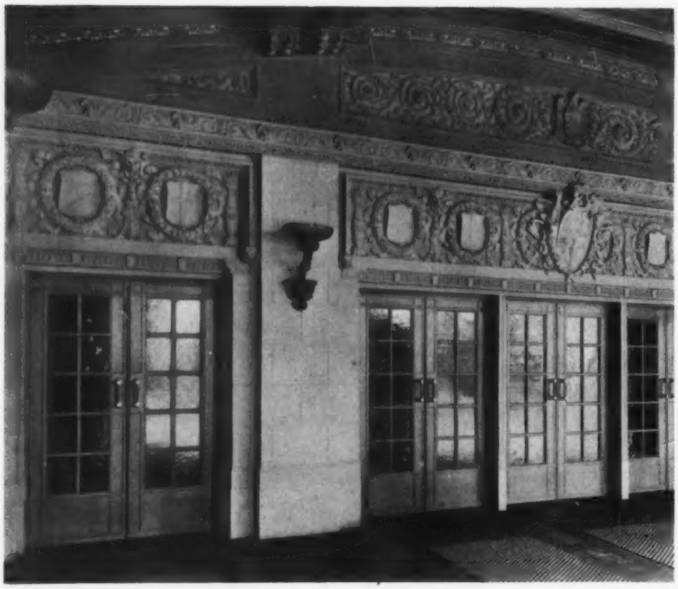
depth of the auditorium. Since the theater has been placed at the rear of the building plot, approaches of considerable length are required from the main entrance, but the auditorium can be quickly emptied after a performance by means of the ramped passages which are entered from several doors at the sides of the auditorium and which lead to side streets. This arrangement of ramps enables the audience from either the parquet floor (which is considerably below the sidewalk level on both frontages) or from the balcony (which is only slightly above the sidewalk level on both frontages) to reach the side streets. The seating capacity of the auditorium is approximately 3,500.

Fountain, End of Plaisance, the California Theater

The Granada Theater has been given a thoroughly complete electric lighting equipment which includes the largest installation of dimmers in the world. The main switchboard is operated by means of a special system with contactor rooms in the basement; the equipment provides four circuits at each outlet, affording the use of red, blue, amber and white lights, all on dimmers for use in the theater proper as well as on the stage. An elaborate system of flood lighting has been installed and supplies light from the ceiling, the side walls and from the front of the balcony. Ventilation is supplied from the roof levels, from which the fresh air is drawn, washed, heated or cooled, and then delivered by means of a plenum system to the parquet as well as to the balcony floor. Thermostat control is had, and deviating from the usual procedure, the parquet and balcony have wholly separate systems of ventilation, the theory being that it may be—and in fact it is—desirable at times to ventilate one floor and not the other, since in this theater smoking is



Plaisance on Balcony Level, the Granada Theater, San Francisco



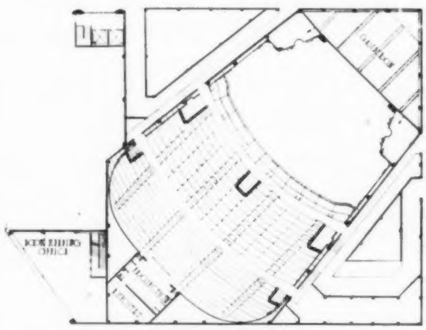
Vestibule of the Granada Theater

permitted in the balcony but not upon the lower floor, thus requiring separate systems.

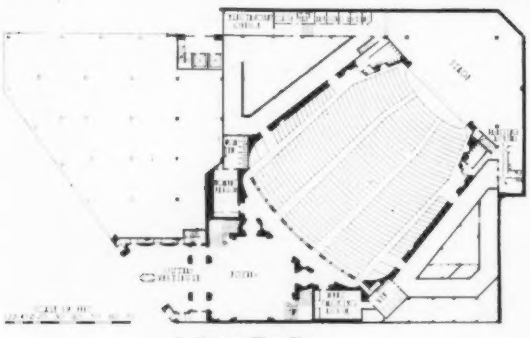
In the case of the California Theater the building plot was considerably smaller; shops occupy the street frontage of the ground floor, and the entrance foyer opens directly into the auditorium instead of being approached by the long corridors or passages which the planning of the Granada Theater on a much larger plot necessitated. The space at the front of the building upon the second and third floors, overlooking the street, is taken up with smoking rooms and women's rest rooms, the area above the third floor being occupied by the rear rows of seats in the steeply sloping balcony, which are thus brought directly against the front facade, which instead of being designed with windows has the exterior of the upper floors arranged in large panels. The entire facades of the two street fronts are of mat glazed terra cotta of buff and orange, in the design of which, as already said, the style is a modified Gothic with considerable use of Spanish detail. Additional color is given the exterior of the building by painting the window sashes emerald green.

The thoroughly complete equipment which was installed in the Granada Theater has been duplicated, in a large measure, for the California Theater, which is provided with much the same electrical stage mechanism and the same system of ventilation. The auditorium of the California Theater has also been given the long and somewhat narrow form, and as in the Granada the tiers of boxes which were once placed at either side of the proscenium arch have been left out. The seating capacity is about 2,400.

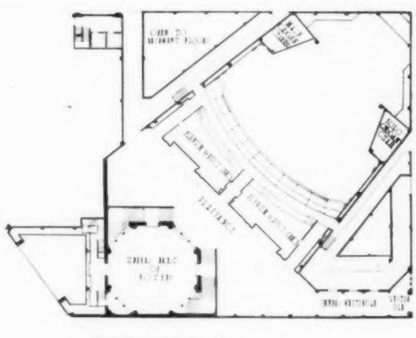
In both of these San Francisco motion picture theaters the rich and highly ornate character indicated by the exteriors has been preserved within. The treatment of a theater seems to demand a gorgeousness which belongs to the world of stageland, to present the appearance of gaiety and festivity which should be present in a theater perhaps more than in any other place of public entertainment. This richness of decoration is especially emphasized in the interiors of the Granada Theater and is indicated in the illustrations included here, while in the long approaches which lead from the main street entrance to the auditorium proper additional opportunity has been given to impart that appearance of luxury which the purpose for which the building is used renders desirable. Full



Balcony Floor Plan

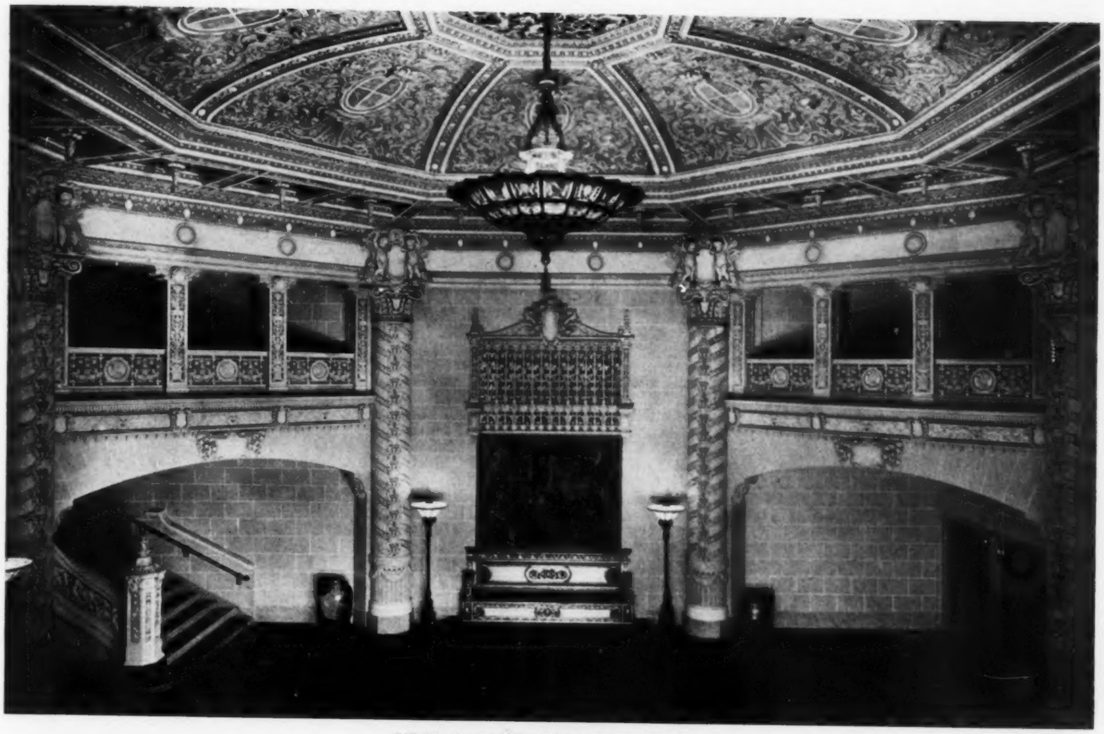


Auditorium Floor Plan

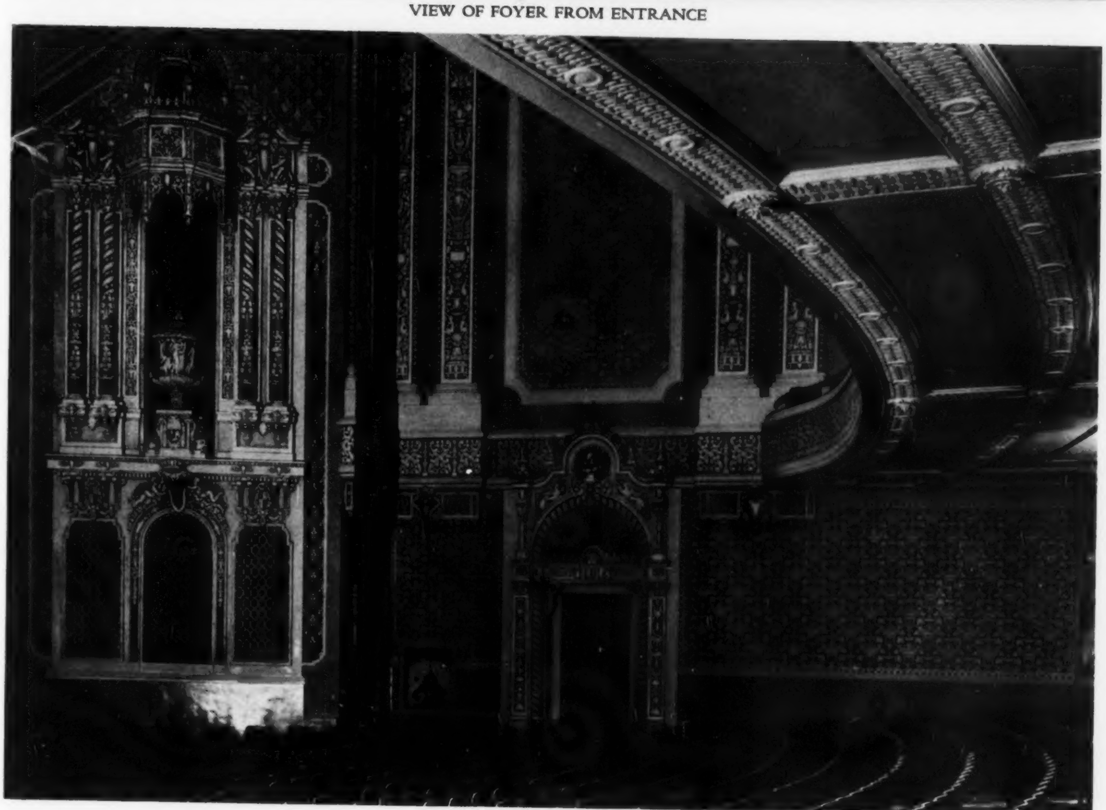


Mezzanine Floor Plan

The Granada Theater, San Francisco



VIEW OF FOYER FROM ENTRANCE



DETAIL OF AUDITORIUM

THE GRANADA THEATER, SAN FRANCISCO

ALFRED HENRY JACOBS, ARCHITECT

Ramp from Side Vestibule Leading to Plaisance, the Granada Theater

use has been made of the bold and striking motifs in which the luxuriant Spanish renaissance type abounds. The lavish use of relief upon columns, pilasters and the parapets of the balconies as well as for ceilings involves much use of color and gold, the decoration being particularly ornate about the proscenium arch with which there have been combined the grilles through which the sound of the pipe organ enters the auditorium.

With the California Theater the Gothic details of the exterior indicate the decoration which may be expected within, for use has been made of Gothic motifs wherever possible, much ingenuity being shown in the adaptation of ornament to different purposes. Particularly successful is the use of Gothic motifs for the proscenium arch and its surroundings, especially for the grilles above the arch.

Detail of Turret, the Granada Theater

In any building of a public or semi-public nature, the patrons of which are largely women, considerable attention must be given to such adjuncts as rest rooms and dressing rooms, and their treatment offers many opportunities for adding to the surroundings that touch of domesticity which their uses render necessary. The departments for the use of men patrons, such as the lounging and smoking rooms, offer added opportunities for appropriate decoration and furnishing which in these theaters have been made the most of. The walls of plain gray or tan which are often used in these lounging and retiring rooms create an excellent setting for figure and color in draperies and floor coverings, such rooms being generally so furnished and decorated that they are of smaller architectural importance than the theater.

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

The Culinary Department and What It Means to Architects

By N. W. ALDRICH

WHILE it is to be admitted by everyone that the culinary department of a hotel requires more study than any other detail, it is in a great many cases left to the last, simply following an old time custom. Plans are carefully drawn showing all the arrangements of rooms and hotel accessories, and frequently an indeterminate space is left somewhere in the basement and marked "kitchen." There are many instances where the kitchen layout, and in speaking of the kitchen we mean the whole culinary department with its service rooms and mechanical plants, has been the source of much embarrassment to the architects and engineers because of insufficient provision for their important functions.

In the old days, the days of the "tavern" and many of the famous old hotels (some of which are still running), there were probably several reasons why this department was left to be studied out after the architect had put the finishing touches on the other departments, making everything so beautiful and pleasing to the tourist that he would not fail to tell his friends of the one place which was ideal and according to his liking,—the last word in hotels. Surely enough there would be ample space for the kitchen, bake shop, serving rooms, storerooms, laundry, etc., and in many cases, more room than necessary, because the building covered a large area, and the basement, which appeared to be the logical place for these departments, would surely take care of itself when the time came to install the various kinds of equipment. The overhead of those days was small compared with that of today. Competent servants were trained to care for the various departments and took pride in producing the best results possible. The reputation of many a hotel has been built up on its standard of food and service.

From these departments, which were scattered in all directions from the real base, their products had to be continually transferred either to the kitchen, serving or dining room. Naturally it required many hands for this work alone, and now the old timer can plainly see how much he could have saved, even in the days when labor was cheap and plentiful, if his culinary department had been more carefully planned and condensed. This has already been proved by those who have remodeled or built anew. By condensing these departments as much as possible, and at the same time planning the various branches in such a manner that they may be operated conveniently, the larger staff of unskilled servants required for transferring food or dishes from place to place is eliminated. The person in charge of this department is better able to give each of its branches his personal attention without traveling through miles of corridors and stairways each day. Also, by having more time to be devoted to other work, he may eliminate the need of an assistant or more competent or higher-salaried persons in charge of the various branches, which ordinarily he would seldom visit unless called upon by the manager to adjust some complaint.

The Value ot Good Planning

Space conservation is not the only conside ation in the modern kitchen layout. True, the reduced payroll due to more intelligent planning is an important factor, but the morale of the employes must be considered and provision must be made for their comfort and convenience. If the employes are not given proper dining rooms and are not allowed proper food they are not likely to stay and work. In the old days the "help" were served anything which might be left over and were told to eat that or nothing. Imagine trying to deal with present-day employes on such a basis! Dining rooms for both men and women employes, locker rooms and proper toilet facilities must be provided, and these take space. Perfection is almost impossible to attain in a culinary department layout; the essentials, however, should be so arranged as to permit easy communication, minimum interference and minimum encroachment on seating space for guests.

It is not wise to spoil the chances for proper service by crowding as many tables as possible into a dining room, which in most cases the owners demand. Every chair in the dining room represents an overhead, and providing the service is slow, this chair will not net as much as the chair where proper service is given. The person who waits 20 minutes longer than he should for his order is not only wasting his own time as well as growing dissatisfied with the service, but at the same time is occupying valuable space. The waiter who steps from the dining room to the kitchen and returns with one's order in

a minute or two, will not wear the same expression as the waiter who is gone 10 or 15 minutes and has spent half of his time traveling through corridors and climbing stairs, and the waiter with the grouch, together with the customer who is entitled to a grouch, will often make more trouble than a Spanish omelet made with musty eggs. Had hotel proprietors given more thought to this problem years ago, they would not have spent so many unpleasant mornings sitting in the lobby watching their guests (especially commercial men) toss their keys to the clerk and rush across the street to a restaurant or quick lunch, where they would eat their grapefruit, eggs, toast and coffee, and be on their way in the same time it would take for the hotel waiter to give his order to the cook, or while the captain was chasing back and forth to the kitchen, looking for the waiter who belonged on that station.

Installing Cafeterias

During the past few years, and especially the last three, nearly all hotels have adopted the quick lunch or cafeteria plan, and in this way have been able to get not only the price of three square meals as well as lodging from the traveler, but have received as well the patronage of hundreds of others who appreciate small portions of properly cooked food at moderate prices. In many cases the café or grill room has been remodeled for such a purpose, and as a rule it works out to perfection, owing to the fact that it was originally connected with the kitchen; in case it was not, it means either a long distance to transfer food, or so much extra equipment as well as skilled service that it represents practically the expense of another department. Therefore the cafeteria or lunch room, as well as the dining room, should be when possible so located that the individual who is in charge of the kitchen and its branches would be able to oversee the service of this department as well.

It is not always the largest kitchen that gives the best service, and the same rule that applies to the culinary department as a whole applies to this section more than to any other. In this branch where there are meat cooks, vegetable cooks, salad men, storeroom girls, dishwashers, waiters or waitresses, and bus boys, all working together, care should be taken that each and every person can perform his or her duty without interference.

Air locks between dining room and kitchen are of great importance in preventing the spread of noise and odors from the kitchen, and although they do not add beauty, and in most cases would ruin the dining room, there is seldom a case where they cannot be included as a part of the kitchen without doing damage or interfering with the arrangement of the equipment. Narrow and shallow air locks are not only useless, so far as noise and odors are concerned, but will keep the steward busy buying crockery and glassware; they will also keep a boy busy with the mop and broom. Air locks should be deep enough to allow the waiter to pass without both doors being open at the same time. This will enable him to walk more naturally, keep his balance easily and open the second door without difficulty. As it is natural for the average waiter to keep to the right, try to keep him moving to the right by having both doors open by being hinged on the right and close against post in center.

To the right of the air lock, after entering the kitchen, would be the logical place for him to deposit used dishes, glass, silver, etc., and providing space is available for washing glass and silver, this section of the kitchen should be equipped for that purpose. The opposite side of the air lock, and where the waiter passes on his return to the dining room, should be equipped as serving pantry, and in most cases this branch can be so arranged that the space taken up by the air locks would never be missed.

The arrangement of the other fixtures required in a kitchen will of course depend upon the space of the floor as well as upon the amount of business expected, but no matter how large or small the kitchen may be, it is practical to keep the ranges, broilers, and any cooking apparatus either in the back of a small kitchen or the center of a large kitchen, whereby the odors and heat will be drawn *away* from the dining room side by means of a natural draught or an exhaust fan. This will cause the air in the dining room to take the proper course, through doors in the kitchen, thence to hood, instead of being reversed by too much dining room ventilation, which often happens, especially in cold weather.

It is extremely important in arranging a kitchen layout, and this applies also to the serving rooms, that the fixtures be arranged so that the waiters have a definite progression from "soup to nuts." The "path," as it is called, leads the waiter through the department where he obtains the various articles he is to serve without retracing his steps or crossing the line of other waiters. As each article is "picked up" he moves on until he leaves to enter the dining room. As he removes the used dishes from one course, he must have a place convenient as he enters the service portion to leave them. Then as he progresses he "picks up" the other dishes without interfering with waiters serving the same or other courses. To arrange the "path" properly is the big problem in hotel or restaurant kitchen planning. One can readily select the type of fixtures and easily determine the relative demands for fixtures, but many a good kitchen has been spoiled as to efficiency by improper planning.

It would be highly desirable for the architect or engineer in making plans for a building where kitchen equipment is required, to consult with the chef and also with an equipment expert before arranging construction details in such a way as to impede the service when the kitchen is in use. This is one phase of building construction which is so seldom encountered in the ordinary practice of the average architect that only by consultation and co-operation can the best results be obtained.

Electrical Wiring Layouts for Schools

(CONTINUED)

By NELSON C. ROSS, *Associate Member, A.I.E.E.*

THE arrangement of wiring in no department of a school building is more important than that of the assembly hall, particularly since such a room is often used for purposes which do not belong strictly to the school's work.

The Assembly Hall Stage. In the larger assembly halls, where large stages are provided, certain lighting effects are at times required, and standard dimmer banks with multi-colored lighting are used. Where this is done the regular dead front type of theater switchboard is installed, with interlocking switches and interlocking dimmer equipment. In the smaller halls, however, this is not required, nor is dimmer equipment in general use.

The best methods of lighting the stage will depend more or less on the proposed stage equipment, as well as on the stage construction. If a gridiron is provided over the stage it will be necessary to make use of standard stage border reflectors, these arranged to be raised and lowered by means of cords and pulleys. From one to four borders will be required for stage lighting, depending upon the depth of the stage and the nature of the equipment. One border reflector is located just back of the proscenium opening, the placing of the remaining borders depending on the location of the flies. The lengths of the borders for this work should approximately equal the width of the proscenium opening. Each border should be fitted with three or four circuits controlled from the stage switchboard or panel, about 12 lamps being allowed to each circuit and these spaced alternating on 10- or 12-inch centers so that a portion of the light may be used at will, or so that different colored lamps may be used if desired. In addition to this, two or three single-lamp outlets should be provided in each border and connected on one circuit, these to be used as "working lights," and controlled from the stage panel.

The outlet for each border reflector should be located on the gridiron and near the center of the stage, the wires running in conduits from the outlet to the stage panel, and from the outlet to the border by means of a flexible cable containing the proper number of wires. The cable should be of sufficient length to permit the borders being lowered within a reasonable distance from the floor of the stage for cleaning and the replacement of lamps. It is also good practice to allow at least one extra circuit in each cable for use in case of the breaking of any one of the regular circuits.

In the event of a gridiron's not being considered, but a high ceiling provided over the stage (as with the use of a drop curtain), border reflectors will be required as just described to give satisfactory illumination. When, however, the ceiling is low and the depth of the stage does not exceed 16 feet, the stage may be satisfactorily lighted by means of a single row of ceiling receptacles, these installed on the ceiling at approximately 12 inches from the rear of the proscenium arch; the outlets should be spaced 10 or 12 inches on centers and connected on three or four circuits with lamps alternating, the circuits controlled from the stage panel. The outlets may be used with some type of open opal reflector or may be used without reflectors, since the lights are concealed at the rear of the arch and cannot be seen from the hall. The light reflecting from the ceiling gives uniform illumination over the stage at a much less installation expense than would be the case if borders were used.

As a rule at least 36 receptacles should be used in this work, with two or three receptacles for use as working lights. It is also advisable to include the complete installation of these receptacles under the wiring contract. When borders are required it is advisable to specify that the borders shall be furnished complete with the full equipment of cords and pulleys.

Footlights. This equipment should be provided in all cases, regardless of the size of the assembly hall. If the stage is large and is to be used for fixed work, the standard theater footlight reflector will be required. If, however, the stage is to be used for school purposes and for lectures more than it is to be used for plays, some type of folding footlight will be better, as this gives a clear stage when the lights are not required.

A straight footlight trough permits the use of a folding footlight reflector, practically in one piece, and the reflector may be folded into place without removing the lamps or apron. If the trough is to be built on a curve the trough may be installed permanently, with a separate apron. When the lights are required the cover boards are removed, the lamps screwed into the sockets, and the apron set in place, this fitting in lugs fastened to the receptacle box; or a folding type may be used made up in a number of sections, each folding separately and connected together with flexible leads, small sections of the apron being removable and set in place between the sections when the lights are in use. The one advantage of this type is that it does not require the removal and replacement of the lamps when the reflector is used. In the locating of footlight equipment for assembly hall work it is of importance that the trough be placed at a sufficient distance from the front of the stage to permit a student to stand at times in front of the footlights; as a rule there should be a clear space of at least 24

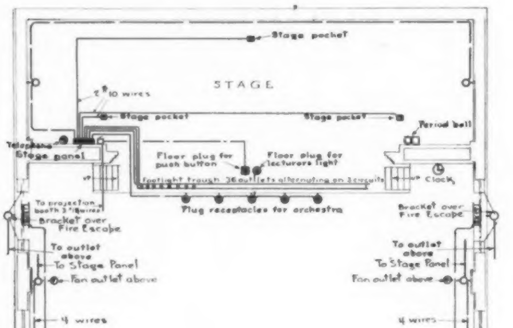
inches. The trough in readiness for the installation of the reflector should be furnished under the building contract, while the installation of the reflector, complete in all respects, should be included under the wiring contract.

Receptacles, etc. With the use of a gridiron, two or three outlets should be placed above the grid for use with drop cords, these outlets controlled from the stage panel and by means of a switch at the foot of the stair leading to the grid. With the use of galleries outlets should also be located on each gallery and connected with the same circuit. With a shallow stage it is well to locate three receptacles in the baseboard of the rear wall, thus permitting the use of portable brackets, table lamps, or other portable equipment during a play. Two or possibly three standard stage pockets should be located in the floor of the stage, one at each side and one in the center, these to be of 30-ampere capacity and connecting to the stage switchboard or panel with two No. 10 wires from each pocket. Provision should be made for a speaker's lamp, by means of a 10-ampere, moisture-proof floor receptacle set in the floor of the stage and at the rear of the footlight trough. This receptacle is fitted with a flush brass plate which is screwed into the cover when the lamp is not in use.

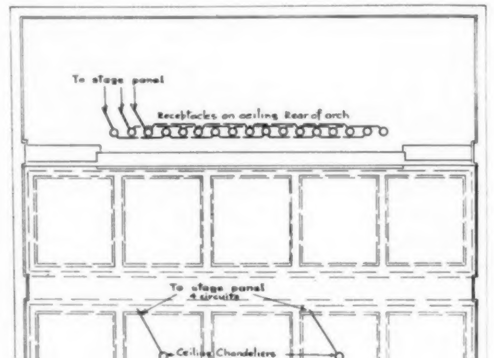
For the use of an orchestra provide five or six flush 10-ampere receptacles in the baseboard, at the front of the stage. These together with the outlet for the speaker's lamp may be connected on one circuit and controlled from the stage panel.

The Stage Panel or Switchboard. In the larger halls, where a standard type of stage switchboard is used with dimming equipment, provision is always made for this board at either the right or the left hand side of the stage. The board is set at a point 5 feet from the wall, the dimming equipment mounted over the switchboard so that the dimmer handles are convenient to the man operating the switches. The master fuses are located on the rear of the switchboard and in convenient locations for replacement; all circuit fuses, however, are located in what is termed a "magazine cabinet," which is made up of steel and located on the wall at the rear of the switchboard. Ordinary porcelain fuse blocks or cutouts of the plug type may be used in this cabinet, there being several compartments and a number of narrow doors permitting access to the fuses and cutouts. Connection between the magazine and the switchboard is made with wires in conduits.

For the average assembly hall, however, where dimmers are not to be used, this type of stage panel is not in general use, as a more simple and less expensive type of panel will give satisfactory service. This panel may be of the dead front type, with push-button switches, snap switches, or toggle switches, of the type used on the panels of the general lighting service. This panel should be set in a steel cabinet and flush with the wall at some convenient point; it may be made in two sections, one



First Floor Plan



Balcony and Ceiling Plan

Typical Wiring Plan for Small Assembly Hall

section containing all switches controlling the circuits of the main lighting of the assembly hall. This includes all ceiling illumination as well as ceiling lights under balconies and at balcony fronts, etc. The second compartment should contain the switches controlling all stage lighting, circuits controlling wall fans (if used), footlights, orchestra receptacles, as well as any bracket lights that may be controlled from the stage. The second compartment should also contain the master switch controlling the stage panel, the three 30-ampere switches controlling the stage pockets, and a remote control switch which will master the buss bars of the first compartment.

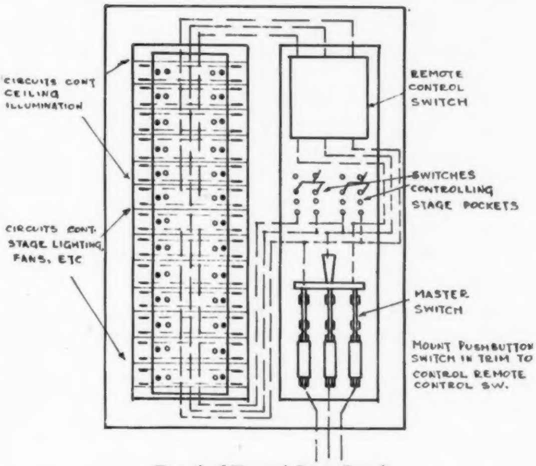
The remote control switch referred to (usually of 60- or 100-ampere capacity) masters the buss bars controlling the general illumination of the hall, and permits all of this illumination to be thrown on or off at will, the volume of light to be thrown on or off by the switch being determined by the number of circuit switches that are "set" in the first compartment of the panel. One push-button operating switch (by which the remote control switch is operated) is located on the stage panel, the second operating switch being mounted in the motion picture booth, thus permitting the control of the general illumination of the hall either from the booth or from the stage panel. Thus, with the use of motion pictures, the hall may be darkened by the operator when the picture is ready, and may be lighted when the picture is finished, or immediately in case of accident or disturbance.

Dressing Rooms. These utilities being provided adjacent to the stage, it is sometimes a good plan to locate the stage panel in one of the dressing rooms. When this is done it is well to connect the circuit feeding the lighting outlets of the dressing rooms with one of the corridor panels so that this light may be controlled on a feeder separate from the feeder of the stage switchboard. This insures light in the event of the fuses of the stage panel opening, and permits the ready replacement of these fuses without delay.

Wall Fans. Such accessories when used should be controlled by means of circuits from the stage panel. They are not a necessity in a properly ventilated hall, but they serve a purpose in keeping the air moving and should be considered. The outlets for the fans should be spaced conveniently and should be 7 feet, 6 inches above the floor; from six to ten outlets should be connected on a circuit. Fans over a balcony should be on a separate circuit from the fans on the lower level, permitting of separate control of the fans on the two levels. Each fan outlet should consist of a flush 10-ampere receptacle, permitting the fan cord to be connected to the receptacle through a plug.

Wall Brackets. These brackets should be considered both under and over a balcony and along the walls; they may be connected to control from the lobby panel and from the emergency circuit, the brackets acting as usher lights and being useful when low illumination is required during a performance. At times two- and three-light brackets are considered, each outlet being double-circuited, one circuit and half of the illumination controlled from the stage, the other half controlled from the lobby panel.

Exit Lighting. A complete equipment of exit signs should be installed throughout the hall, these being located over each of the exits, both in the hall and in the corridors, so that there may be no misunderstanding as to the proper exits. The signs are usually set flush and are worked into the details of the mouldings. All signs should be fitted with two



Detail of Typical Stage Panel

receptacles for 25-watt lamps, the lamps being connected in multiple so that there will still be light if one of the lamps should burn out. In some instances the two lamps are connected on separate circuits, thus permitting of double control of the exits. All exit signs should be controlled on circuits from the lobby panel and on a separate emergency feeder circuit. There should be an outlet provided over each of the fire escapes, these also connected to feed from the lobby panel and on the emergency feeder circuit.

Provision for Organ. Where an organ is considered in the assembly hall provision must be made under the wiring contract for the control of the blower motor and for pipe raceways to permit the installation of the wiring to the console and organ lofts.

Some room will be provided on the basement floor to provide for the installation of the organ blower. The furnishing of the blower and all equipment ready for wiring will be provided under the organ contract, together with all wiring to and between the low voltage generator, the organ, and the console. The electric contract should provide a 2½-inch empty conduit from the location of the console to each of the organ chambers or lofts, and when more than one loft is to be used, a similar empty conduit should connect the lofts, these conduits terminating at al' outlets in a T. & B. bushing

and being left in readiness for the drawing in of the wires.

The electrical contract should also provide conduit and wires from the console to the blower room, with push-button at the console and a remote control motor starter in the blower room, together with all connections to and between the power service, the motor and the starter, so that the organ motor may be started and stopped from the location of the console. A pilot lamp is to be mounted at the console which will glow when the motor is in operation and be canceled when the motor is stopped. An outlet is also required for use in the console, this controlled from a local switch so that a lamp may be burned to prevent dampness.

Provision should also be made for a 600-watt heater outlet in each of the organ lofts, a single circuit being carried from each of these outlets back to and controlled from the stage panel. A pilot lamp should be located at some convenient point on the stage or at the panel so that the lamp will indicate when the heaters are in operation; a standard 10-ampere receptacle is provided in each of the lofts, permitting the ready connection of portable electric heaters.

The Motion Picture Booth. The booth should be wired for two projectors and one stereopticon lantern, also for lighting and for the operation of a ventilating fan. The lighting outlets should be controlled from circuits from the lobby panel. The projectors and the fan should be controlled from a separate switchboard or panel located in the booth.

The booth panel should be mounted in a flush steel cabinet at some convenient point, a circuit of two No. 2 wires carried from the panel to each of the projectors, the conduit being run in the floor construction and turning up, with an elbow at the location of the projector machine and terminating in a porcelain capped fitting 12 inches above the floor; 4-foot ends should be left on the wires to permit of connection with the machine. Two No. 6 wires should also be run from the panel to the location of the stereopticon outlet, this outlet consisting of a standard 50-ampere stage pocket set in the front wall of the booth and connecting with the lantern by means of a plug.

If direct current service is furnished the building it will be necessary only to reduce the voltage, through resistance coils (located in the booth), and either arc or incandescent motion picture projectors may be used. If alternating current service is furnished and arc projectors are to be used, it will be necessary to provide direct current through a motor generator set or converter for the satisfactory operation of the arc projectors. If projectors of the incandescent type are to be used they may be satisfactorily operated on either alternating or direct current, while if it is assured that arc projectors will not be operated the wire sizes just given may be reduced to No. 6 wire for each of the projectors. While the use of the incandescent projector is becoming more and more common in smaller schools and motion picture houses, the arc projector is in common use throughout the larger schools and theaters, and it is questionable whether the wire sizes should be reduced below those required for the arcs, even if the incandescent projectors are considered.

The motor generator set may be included under the electrical contract, or may be later purchased as part of the motion picture equipment. A suitable location for the set may be in the boiler room section and under the charge of the engineer, or in the service room at a point near the service switchboard. A remote control switch and starter may be used by means of which the set may be started and stopped from the booth, the usual pilot lamp being installed in the booth to indicate when the set is in operation.

In many instances, even when the use of an incandescent projector is contemplated, an empty 1½-inch conduit is installed between the booth and the service room, permitting the later installation of the set if so desired.

Not less than two No. 0 wires should be run from the service room to the booth to provide direct current to the arc projectors, and three No. 1 wires should be run from the service switchboard to the lobby panel and connected to the buss bars for the general lighting controlled from this panel, this circuit continuing from the lobby panel to the panel in the booth to provide an alternating current breakdown service for the projectors and for operation of the ventilating fan.

The booth panel should contain three 100-ampere, two-pole, double-throw fused knife switches for the control of the two projectors, and one 60-ampere, two-pole, fused knife switch for the control of the lantern; should also contain one 30-ampere, two-pole, single-throw fused knife switch for the control of the fan for the ventilation of the booth. The center poles of the double-throw switches should connect with the leads to the projectors and the lantern, the outer ends connecting to separate sets of buss bars fed from the alternating and direct current feeders respectively, thus providing two services for the panel, the ventilating fan connecting to the alternating current buss bars only.

Signals Between Booth and Stage. A return call buzzer system should be provided between the booth and the stage, this consisting of a small buzzer located on the stage with a similar buzzer in the booth. At a point on the stage near the location of the speaker's lamp, a moisture-proof floor outlet should be located, this complete with receptacle, pear push-button, plug and 10-foot bell cord. A standard wall type push-button should be located in the booth, and the outlets connected by No. 16 wires in conduit, providing a return call bell or buzzer system by which the stage and booth may signal. A 6-cell dry battery should be provided to operate the system, the battery cells located in a flush cabinet either on the stage or in the booth, as desired.

Plate Description

OFFICE AND RESIDENCE OF FREDERICK STERNER, ESQ., New York. Plates 57–61.

In this successful alteration, of which Mr. Sterner himself is the architect, there is given a striking illustration of what can be done with a city residence obsolete as to type but strong as to structure. The building which is at the southwest corner of 65th street and Lexington avenue was until recently a typical example of the New York city house built perhaps a generation ago, with walls of brick excepting that upon the avenue front, which was of brown stone, and possessing the regulation four stories and basement, the main entrance which faced upon Lexington avenue being reached by the usual high stoop.

The alterations include the building of an extension at the rear of the original structure (the house as it now stands occupying the full area of the plot), the doing away with the high stoop and changing the original main doorway into a window, the arrangement of a new entrance at the basement level on the street side, and particularly the addition of what is in effect a hip roof of slate and the covering of the exterior walls with cream colored stucco of a slightly rough cast. The severity of the expanse of wall upon the street side is relieved by skillful use of parge work, relief wrought out in plaster, for certain areas.

Wherever possible use has been made of existing exterior and interior walls, the arrangement of the different floors being such as to afford a few large, ample rooms rather than a larger number of smaller rooms. The illustrations give an excellent idea of the interest of the interiors, due largely to the skill with which use has been made of much ancient paneling and carving and many excellent antiques.

HOUSE OF WM. CLARKSON VAN ANTWERP, Burlingame, Calif. Plates 62–68.

The Tudor style, in which this large house has been designed, is particularly well suited to the site which is an extensive natural park, situated on a gently sloping hillside which is partially covered with a fine growth of old oaks.

In arranging the interior use has been made of a collection of interesting and valuable antiques which have been collected by Mr. Van Antwerp. In the three main living rooms, P. W. French & Co. of New York collaborated as decorators with the architects of the house, Bakewell & Brown of San Francisco.

Entrance to Office and Residence of Frederick Sterner, Esq.

FIRST CHURCH OF CHRIST, SCIENTIST, MERIDEN, CONN. Plates 71, 72.

The extremely attractive appearance of this village church is due to the use of simple materials in a pleasing way. The structure, which recalls certain old churches or meeting houses in New England, is but one story in height, the rooms at the rear giving much the appearance of transepts, while to relieve what might easily be the somewhat squat appearance of a building of which the area is large in proportion to its height a graceful cupola is built above and slightly back of the pediment which marks the front. The structure is Georgian in character, with round-headed windows, and the architects, Orr & del Grella of New Haven, Conn., and Lorenzo Hamilton of Meriden, associated, have used selected common brick of varying shades with occasional dark headers. Joints are flush and are yellow-brown in tone, and the trim which is painted a deep ivory ties in well with the color of the walls.

A coat room is placed at each side of the entrance vestibule, and the rooms back of the pulpit platform include a Sunday-school room, several class or committee rooms, and a number of toilets. The interior draws rather more heavily upon Italian precedent than is usually the case with a Georgian church, for the ceiling is vaulted and of plaster rough in texture and of a russet gold in color, the window penetrations being carried by corbels. The interior trim is of a deep ivory, the rails of the pews being of Spanish walnut. Window draperies are of silk rep, soft russet in color with a suggestion of old blue in the folds of the material. The three hanging candelabra and the wall brackets which light the church are of wrought iron. The disposition of the choir gallery and the reading desk or pulpit, tasteful as it is, is merely temporary and is to be re-arranged later on.

EDITORIAL COMMENT

WILL THE ENGINEER SUPERSEDE THE ARCHITECT?

THE past few years have seen developments in the professional service of designing buildings that make it natural to wonder if the architectural profession is advancing or losing ground. Certainly there is ample evidence, especially in the East, that the field of practice for engineers and engineering-contracting organizations is constantly widening and embracing types of building that were formerly considered the architect's undisputed province. The growth of building practice among engineers came about in the last decade, or more primarily because of our large industrial development and the increasing use of reinforced concrete for the buildings needed for using it. Reinforced concrete presented a problem well suited to the engineer, and industrial building was nothing more than the enclosing of certain volumes of space with the type of construction most efficient from both cost and maintenance viewpoints.

Following the war there occurred a decided slump in industrial building, and engineering organizations that had been operating in a large way with expensive overhead costs were obliged to find other fields or go out of business. It was but natural for them to turn to office, bank and other commercial buildings that were in demand. In some instances they have not hesitated to solicit commissions for educational and institutional buildings. The fact that they have in many cases been successful in securing this work does credit to their business acumen, but it proves distinctly that the architect has not made the value of his service known to the public.

When one considers comparisons between architecture and structural engineering it is well to admit at once that engineers can construct fully as well and in many cases better than architects. Structure is their chief concern, and their knowledge of the strength of materials and the forces at work in a structure is superior to that of architects. The realization of this through their contact with architects has made it seem to them that they possess the strongest asset in the requirements for practice, and that it would be comparatively easy to supply the apparent part played by the architect in the design by adding to their organization a group of architectural designers. They have secured their opportunities to build by means of good, direct salesmanship—a factor in modern business that the architect has shrunk from adopting because it necessarily means self-appraisal of one's value.

The points on which the engineers can and do claim superiority to many architects are just the features of a building operation that are obviously understood by a client and have, therefore, his immediate interest. He knows that there is a difference between good and bad construction; he knows that there is a difference in cost between different materials; he realizes that good superintendence will insure a better building; he knows that businesslike methods in following contracts and payments will avoid losses, and these are the points of service stressed by the engineer.

Unfortunately for the architect, the value of his services lies along lines that cannot be so readily measured, and the client has little or no appreciation of them. He doesn't realize sufficiently that his building is a vital part of the business, institution, or whatever is housed within it, requiring a distinct, and individual plan to fit the particular needs. This is where the architect's service is superior to the engineer's, and it is the root of all successful building. The various advantages the engineer offers can be provided by any architect capable of creating an organization or intelligent enough to secure expert advice when needed, but the fundamental requirement for good building—the ability to plan—belongs to the architect, and it is something that does not function well in an employe.

Blame cannot be placed on the engineers; they have developed their service openly and they have in the majority of cases provided their clients with buildings that compare with their expectations. The field is open to any and all who can serve it. The difficulty is one that the architects must meet themselves; they must decide if architecture as it is practiced today is to become separated from the business world and employed only in the case of monumental buildings or special work for wealthy individuals where art is the prime consideration and business principles do not count.

It is assumed that any individual or firm practicing architecture must provide all that the engineer does and more, and with this fact capable of proof, serious efforts must be made to show the public wherein the architect's service has special value and why such service can be supplied only by an architect. This message can be conveyed to the public through regularly organized effort of architectural societies and by the individual architect, not necessarily by printed advertising in the case of the individual, but by showing no hesitancy in meeting the engineer in open competition and by presenting his claim for consideration in a businesslike manner that is understandable to the average man. Considerations of beauty will always be paramount with architects, but these are difficult of explanation to the public, and when the architect lays greatest stress on this phase of his client's problem, he opens the way for others to approach and make capital of the points he has left uncovered.

DECORATION *and* FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED
PROFESSIONAL & DESIGN INTERESTS
WITH SPECIAL REFERENCE TO
AVAILABLE MATERIALS

AN INTERIOR FROM THE COLONY CLUB, NEW YORK
DELANO & ALDRICH, ARCHITECTS

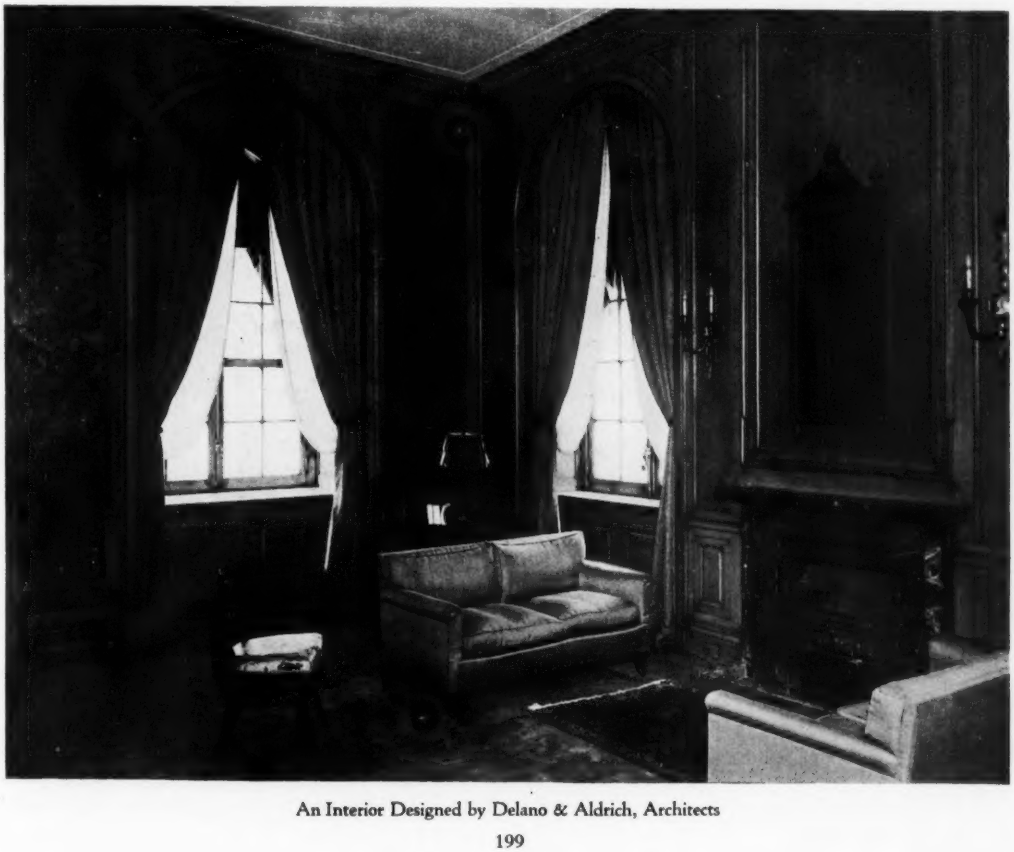
A Plea for the Architect's Interest in Textile Fabrics

II. WHAT GOVERNS THE SELECTION OF A FABRIC

By HORACE MORAN, INTERIOR DECORATOR

MUCH interest attaches to the use of textile fabrics in interiors, and many failures may be laid at the doors of those designers who have not found wherein lies that interest. It is safe to assume that most interiors are designed without more than a casual consideration (or none at all) of the kind of fabrics or even the color of the fabrics which are sure ultimately to take their places in the scheme. Yet the very area of fabric used, if only for curtains and seat coverings, may materially affect the general composition, whereas with walls of fabric added the weaver's art may almost dominate the decorative effect of the interior. This seeming lack of appreciation is a natural consequence in the evolution of a structure for habitation, for the house is long in the building and involves many questions of cost before it is ready for furnishing. Then again, it is an unwritten law of residence designing that the wife of the client shall have much to say as to the curtains and other textile fabrics to be selected.

If then, the product of the loom is to be selected at the eleventh hour the designer, whether architect or decorator, should all the more be prepared with a store of knowledge and experience to decide quickly but intelligently when the problem reaches this stage. He may then stand off from his room, as a painter would from his picture, and untrammeled by natural laws that controlled him in building the structure, or traditions as to architectural design, select a fabric for the æsthetic elements it has which are needed to complete the composition. What then are the elements to consider as the basis for the selection? Texture of surface, apart from all thought of design or color, will first of all determine the selection of the kind of weave, either silk or wool, linen or cotton. It will decide as between luster and dullness of surface, between fineness of texture or loose, open weave. There is the danger of course of attempting to formulate rules as to texture which although a possible guide to salesmen would never be tolerated by the independent mind of the artist. For instance, the controlling surface value of sixteenth century tapestries on the walls would seem to suggest that curtains of wool or other lusterless texture would have the appropriate quality in the same room. Experience has shown that the eye is not at all pleased with such strict consistency, but



An Interior Designed by Delano & Aldrich, Architects

An Interior Designed by Delano & Aldrich, Architects

rather with the complete contrast of texture brought about by using silk damask, a material of close, fine weave with a splendid luster—and all this in a room with dull plaster walls and even a heavily timbered ceiling. This combination of textures however does not admit of the damask's competing in design with the tapestry, but rather it should be of a solid color with its pattern large in scale but asserting itself only because of the different texture of the ground. Tapestry and velvets will live in harmony upon similar terms, and yet as an illustration of the result of entrusting such fabrics to profane hands, witness the almost repulsive effect of combinations of tapestry and velvet as sometimes used on furniture seen in the shops, or the pathetic result of the effort of a decorator to increase the area of a wall hanging by sewing a border of velvet around a tapestry.

Color, as the second element, includes also the absence of color, as it may be that the textiles used must not detract in any way from the colors introduced in the structural features, but serve only a useful purpose. The trade nomenclature of textile colors is meaningless to the artist, for it is the tone or shade of a color and its inclusion of other colors, as well as the effect of the natural or artificial lighting in place, which interest him. Nor is this all, for he will only pass upon a fabric when he has seen it in folds, if it is to be so hung, and this partly because its color is affected by shadows, as well as for a reason to be set forth in the next question to be considered.

Design, the third element, when small enough to be without evident scale, almost becomes a texture and should be considered as such. In this group of fabrics are included the minute patterns which are an inch or two in area, and which although of contrasting colors are not of a size to allow the eye to follow a general design.

The dominant feature of design, scale, is not so insistent in fabrics as in the architectural elements. As an illustration, a damask may be designed with a motif recurring every meter and a half, possibly allowing but two such patterns in the height of a curtain. Such a fabric, if of one color with the pattern well distributed and of many details, would take its place readily in a room small in size and in which the other features enjoy the finest of scale. A fabric woven with the ground and pattern of different colors, with the details of the pattern large in mass, demands that its scale be considered, as it will assert itself most forcibly. It is not the size of the pattern, even when strongly contrasted with the ground, that determines its scale, for a large pattern may be made up of small units well distributed over the surface, or else there may be the absence of a repeating pattern as in the oriental designs of long but attenuated trees and vines now commonly seen in printed linen and cotton fabrics which may be in keeping with the most dainty interiors. In the paragraph on colors is mentioned the effect of a fabric seen in folds. No material of strongly contrasting colors and large pattern if to be used in folds will tell its real value if seen on one plane, and it is hardly necessary to explain how these two positions modify the design and color value. A much too prevalent practice today is that of selecting the fabrics for a residence (usually the small suburban house or city apartment) and taking from these fabrics the colors for the painting of walls and furniture. Such fabrics are frequently of printed material and subject to rapid fading which soon leaves the painted features retaining the original bold colors, while the fabrics become mere ghosts of their former selves and have to be replaced with a new lot of the same materials if they are still on the market.

The architect trained to conventionalizing should accept with pleasure the tendency of fabric makers to avoid the naturalistic floral fabrics, our heritage from the eighteenth century, and to seek designs which show an effort not to copy Nature but to suggest her forms and colors in design. How far this will go depends upon the encouragement given by the architect and decorator.

In this country we have fortunately almost passed the stage of slavish copying of the interiors of other times, and designers, both architects and decorators, approach the problem as a void to be appropriately

TWO INTERIORS DESIGNED BY DELANO & ALDRICH, ARCHITECTS

treated with form and color, with due respect for the influence of the light of both day and night. The usual convention which has in years just past led to the assumption that certain types of interior demand fabrics known to have been used in such interiors, is forgotten; now fabrics are selected not because they represent a particular epoch, but because they will lend what is needed in texture, color and scale of design.

In all the periods of good interior design, although all the structural elements reflected the architecture of the time, the textiles used did not necessarily show the same influence. Commonly the looms of other countries furnished the hangings. The silks as well as the floor coverings of the orient commonly found their way into occidental rooms; in fact the designers of the past showed great freedom in the selection of fabrics. A marked illustration of this was the introduction of Chinese materials into the English homes of the eighteenth century. It would seem to have been understood that the textile, not being a part of the structure but rather a live element added to it, could be selected from the looms of any land if it furnished the needed decorative value and served a useful purpose.

Many scientists in France and Germany have sought by futile efforts to establish a scientific basis for color relation, and the designers of fabrics working only on a plane surface have been tempted to stray occasionally into this field of research. No such efforts result in the production of works of art, and they are of as little avail as would be the same process applied to an architectural composition or a picture. Any successful product of the loom which has the interest of both color and design shows at once that it was conceived in joy. There may be colors which by convention are agreed upon as the proper contrast to other colors, and the same applies to forms, but beyond this there is the gamut of colors and forms, the relation of which in the preparation of a design can be felt only by the designer.

Admitting that the designer of fabrics is not restrained by structural requirements or a conservative color range, as in an architectural composition, all fabrics to be used in the structure should be without eccentricities of texture, pattern or color. Too commonly are seen rooms in which the curtains seem to be the only strong color note. The eye, like the moth, is thus drawn towards the windows, the source of light, and away from the room which should be of greater interest.

To sum up: those things which govern the selection of a fabric are its texture, color and design, and that subtle quality of appropriateness which to the artist gives it the desired decorative value in his composition.

The six illustrations accompanying this article have been selected from a number of residences designed by Delano & Aldrich. They illustrate to a marked degree how an architect trained in the use of textiles will instinctively apply in the most subtle manner the principles which govern their selection.

An Interior Designed by Delano & Aldrich, Architects

SERVICE SECTION
of THE ARCHITECTURAL FORUM

Information on economic aspects of construction and direct service for architects on subjects allied to building, through members of THE FORUM Consultation Committee

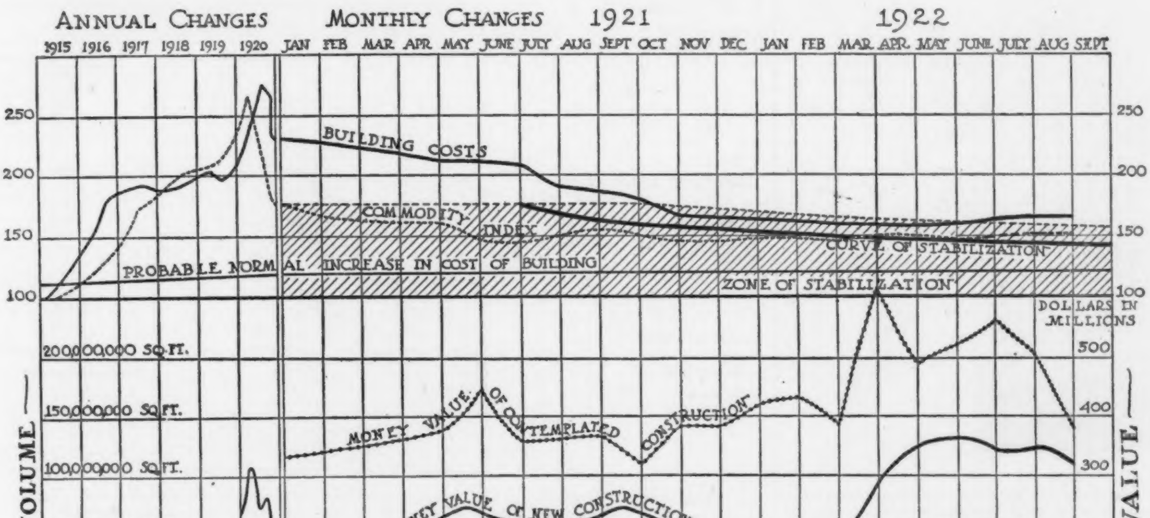
The Building Situation

AS will be noted by examining this chart, the month of August recorded a definite drop in contemplated building construction, while the volume and value of actual contracts let are not greatly under the figures for July. This drop in contemplated construction has been in business, industrial, residential and public buildings.

Contemplated construction in the month of August showed an increase over July in educational buildings, hospitals and institutional buildings. The greatest decrease under July figures was in the classes of industrial buildings and in public works and public utilities. To a great extent this is a seasonal condition, and it is interesting to note that in spite of rising prices there has been only a slight decrease in general classes of contemplated construction.

The cost of building is still in the upturn, and it is certain that if this continues to climb there must be some reduction in building activity. On the other hand, we have the encouraging fact that the disturbance caused by the coal and rail difficulties is tending toward settlement with consequent relief to the building industry. It is quite probable that prices will continue to rise through the late fall and in the winter, but it is confidently expected that with the resumption of normal conditions in the building field a great volume of production will replenish the stocks of building material dealers and re-establish prices for spring building activity on a basis comparable with the similar period of 1922.

It is quite certain that many projects are now being overhauled for the 1923 building period, and in every section of the country architects are reporting an increase of planning activity, and every office looks forward confidently to a busy season during the coming winter in preparation for the spring building.

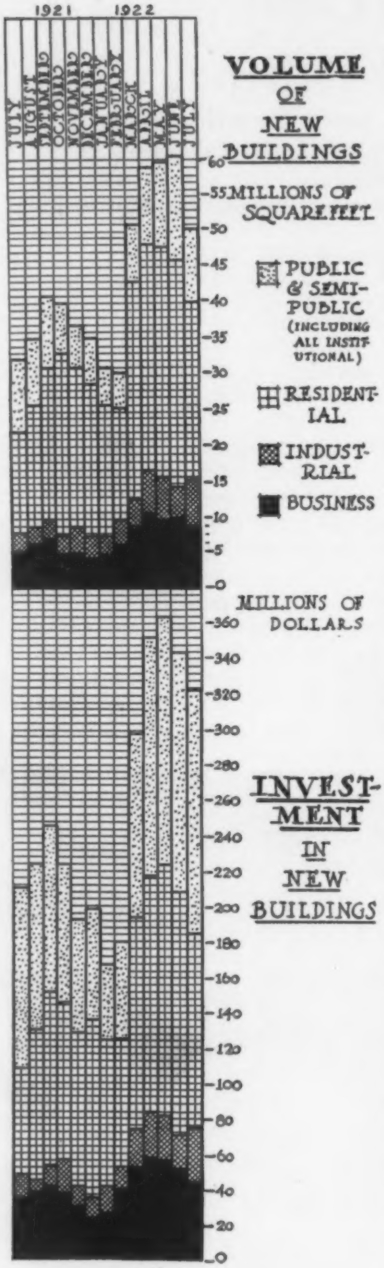


THIS chart is presented monthly with trend lines extended to the most recent date of available information. Its purpose is to show actual changes in the cost of building construction and the effect upon new building volume and investment as the *index line of building cost* approaches or recedes from the "curve of stabilization."

The CURVE OF STABILIZATION represents the building cost line at which investors in this field may be expected to build without fear of too great shrinkage in the reproduction value or income value of new buildings. The index line representing actual cost of building entered the ZONE OF STABILIZATION in the fall of 1921. If this cost line passes *out* of the zone of stabilization, building volume will decrease materially.

The degree of the curve of stabilization is based on (a) an analysis of time involved in return to normal conditions after the civil war and that of 1812; (b) the effect of economic control exercised by the Federal Reserve Bank in accelerating this return after the recent war, and (c) an estimate of the probable normal increase in building cost.

Factors of Fluctuation in Building Costs



Analysis of new construction showing comparative importance of major building types in volume and investment.

Lumber
Price trend line based on soft wood price index presented by *Lumber*. This indicates price variation of yellow pine, Douglas fir, hemlock, N. C. pine, white pine, cypress and spruce

Steel
Structural shapes
Price per 100 lbs.

Reinforcing bars
Price per 100 lbs.

Cement
Price per bbl. without bags

Lime
Finishing
Hydrated, price per 1/10 ton

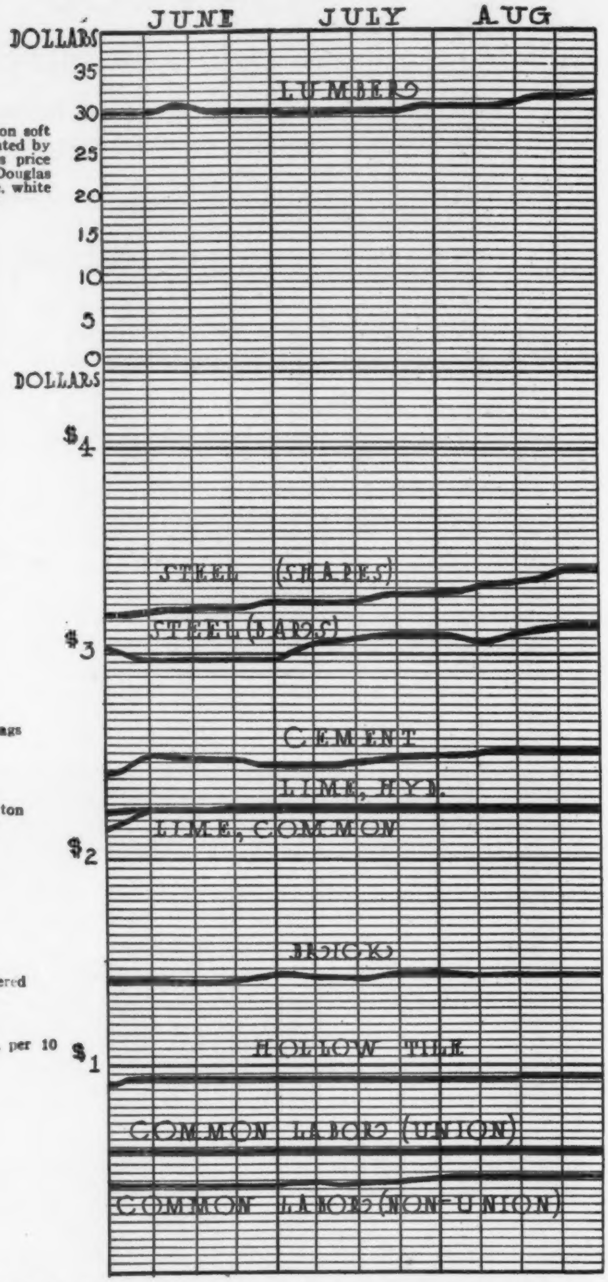
Common lump
Price per bbl.

Brick
Common, per 100 delivered

Hollow Tile
Partition, 4 x 12 x 12, per 10 blocks

Common Labor
Union
Rate per hour

Non-union
Rate per hour



Figures used in developing all trend lines represent average prices to contractors in following cities: New York, Chicago, Denver, Seattle, Minneapolis, Atlanta, Dallas and San Francisco

THE graphic chart at the right is presented for the purpose of showing fluctuations in the prices of a number of important building materials and in labor costs. These fluctuations cover a period of three months and are shown in each issue of the Service Section in order to make possible at least a partial analysis of the building cost trend line as shown on the preceding page.

The volume and investment chart shows the beginning of the seasonal slump, following the large amount of building in all classes put under contract in June. The increase in industrial building is indicative of better business conditions, and the decrease in residential work is partly seasonal and partly due to steadily rising construction costs.

The material chart at the right records the effects of the coal and rail strikes in the inevitable curtailment of production and increase in prices. These are particularly evident in steel, cement and lumber. All steel products have shown steady increases due to the coal difficulty, and the recent 20 per cent increase in common with labor rates. Lumber is seriously affected by the rail situation and is also influenced by steady demand. Building materials prices are said, on the authority of the United States Department of Labor, to have increased 10 per cent within a year, and in this increase lies the danger of another serious let-up in construction.

BUILDING MATERIAL PRICES

Table Showing Average Prices Paid by Contractors for Building Materials at Local Distributing Points as of Aug. 1, 1922. Prepared by Division of Building and Housing of the Department of Commerce from Prices Secured through the Bureau of Census

Commodity	Size or Condition	Unit	Mass. Fitchburg	Mass. Haverhill	N. Y. Buffalo	Penn. Pittsburgh	Penn. Erie	Md. Baltimore	Va. Richmond	W. Va. Fairmount	S. C. Columbia	Fla. St. Petersburg	Ga. Savannah	Mich. Detroit	Mich. Pontiac	Mich. Bay City	Mich. Saginaw	Wis. Milwaukee	Iowa Waterloo	Iowa Des Moines
Common Brick		1,000	$18.00	$25.00	$18.12	$16.00	.....	$20.00	$18.00	$24.00	$12.00	$18.00	$13.50	$16.50	$14.40	$13.00	$12.50	$12.00	$18.90	$16.00
Portland Cement	Excl. of containers	Bbl.	3.00	3.50	2.78	2.85	$3.20	2.85	3.50	2.60	3.50	3.60	3.50	3.20	2.29	2.38	3.00	2.40	2.60	.....
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M.	.....	65.00	.....	50.00	49.00	39.00	28.50	45.00	.....	30.00	25.00	50.00	43.00	37.00	50.00	37.00	45.00	44.00
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.00	.....	.....	.....	40.00	45.00	44.00
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M.	.....	.....	.....	.....	.....	.....	28.50	45.00	22.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M.	50.00	42.00	.....	47.00	50.00	.....	35.00	60.00	.....	30.00	.....	50.00	.....	35.00	.....	33.00	45.00	42.00
Y. P. Flooring E.G."C"	1x4-10'-16'	M.	108.00	.....	.....	72.00	110.00	125.00	72.00	100.00	75.00	115.00	.....	80.00	.....	.....	.....	85.00	80.00	.....
Douglas Fir V.G. No. 2	1x4-10'-16'	M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80.00	.....	.....	.....	85.00	80.00	95.00
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	6.25	7.00	6.00	7.00	6.50	14.00	.....	.....	5.60	.....	.....	7.50	6.50	6.50	6.50	5.00	6.50	6.00
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	8.00	5.60	.....	.....	7.50	.....	.....	.....	.....	6.50	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	.....	8.00	.....	6.25	5.50	.....	6.50	6.75	6.25	7.25	6.50	7.25	6.00	6.00	6.50	6.50	7.50	.....
Gypsum Plaster Board	3/8"	1,000 sq. ft.	.....	50.00	45.00	37.50	45.00	.....	42.00	32.00	45.00	.....	40.00	30.00	40.00	40.00	.....	30.00	32.00	35.50
Lime	Hyd. Com.	Ton	20.00	22.00	.....	20.00	20.00	15.00	16.50	15.00	20.00	.....	22.00	.....	15.00	17.00	.....	.....	25.00	27.50
Building Sand		Cu. yd.	2.00	2.50	.95	3.10	.....	2.00	2.20	3.75	1.00	2.00	2.00	2.75	1.50	2.10	1.75	2.00	1.75	.....
Crushed Stone	3/4"	Cu. yd.	3.00	3.00	1.30	5.50	3.00	.....	3.00	4.50	3.25	6.25	5.00	2.90	1.48	3.75	3.60	2.35	3.50	3.00
Window Glass	Single A 10"x12"	50 sq. ft.	4.50	.....	3.90	.....	.....	5.40	3.85	6.00	3.45	.....	.....	.....	.....	5.15	5.20	.....	6.00	4.50
Hollow Tile	8"x12"x12"	Each	.24	.20	.22	.20	.20	.21	.18	.21	.19	.20	.....	.21	.17	.15	.16	.12	.13	.....
Cast Iron Soil Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	58.80	53.76	.....	74.00	55.00	78.00	.....	.....	.....	.....	52.00	51.00	51.00	.....	50.00	.....
Steel Pipe	1" galv.	100 ft.	.....	10.00	10.00	8.16	.....	8.74	8.50	10.00	.....	.....	.....	12.00	8.50	9.25	9.50	.....	12.00	9.37
Reinforcement Bars	3/4" square	100 lbs.	5.25	2.50	.....	3.00	.....	2.75	2.50	2.50	3.50	5.00	3.00	3.50	2.40	2.25	2.30	2.25	3.20	2.68
Structural Steel	Fab. 6" I-beams	100 lbs.	4.00	5.00	3.20	2.55	.....	.....	4.15	4.25	4.00	.....	.....	3.25	2.25	3.05	3.40	2.35	4.70	2.88
Gypsum Plaster	Neat	Ton	22.00	22.00	.....	22.00	24.00	20.00	20.00	17.00	20.00	22.50	.....	14.00	13.90	14.00	.....	16.00	18.00	13.50
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	13.50	.....	.....	13.50	13.50	.....	20.00	.....	.....	17.10	16.50	17.00	.....	16.00	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	4.50	2.50	2.00	1.95	2.00	.....	2.50	.....	1.75	2.25	1.90	.....	2.75	2.60	2.75	3.65	3.75	2.63
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	1.25	1.80	1.05	1.20	1.00	1.25	.....	.90	1.50	1.50	.75	.....	1.00	1.05	1.00	.....	1.50	1.08

Commodity	Size or Condition	Unit	Iowa Council Bluffs	Mo. St. Louis	Mo. Kansas City	Ill. Chicago	Ohio Cleveland	Ohio Akron	Ohio Youngstown	Ohio Dayton	Ohio Toledo	La. Shreveport	Texas San Antonio	Ariz. Tucson	Wash. Seattle	Wash. Spokane	N. Dak. Grand Forks	S. Dak. Aberdeen	Calif. San Jose	Calif. Sacramento
Common Brick		1,000	$16.50	$14.50	$16.50	$11.00	$16.00	$16.00	$14.55	$17.00	$15.00	$15.00	$14.00	$12.50	$20.00	$13.00	$18.00	$16.00	$19.00	.....
Portland Cement	Excl. of containers	Bbl.	2.42	2.60	2.70	.....	2.92	2.81	.....	2.68	3.28	3.50	3.20	4.40	2.90	2.98	3.20	2.70	3.36	$3.30
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M	43.00	43.00	40.50	37.00	55.00	45.00	45.00	45.00	46.00	43.00	45.00	.....	.....	.....	45.00	.....	.....	.....
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M	43.00	46.50	40.50	.....	.....	.....	.....	.....	.....	.....	.....	55.00	20.00	.....	45.00	44.00	42.00	39.50
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	42.00	46.00	48.50	31.00	47.00	45.00	45.00	.....	42.00	48.00	48.00	50.00	20.00	27.00	.....	41.00	42.00	36.50
Y. P. Flooring E.G."C"	1x4-10'-16'	M	96.00	68.00	75.50	.....	88.00	115.00	85.00	90.00	75.00	78.00	75.00	.....	.....	.....	95.00	.....	.....	.....
Douglas Fir V.G. No. 2	1x4-10'-16'	M	93.00	.....	88.00	.....	.....	.....	.....	.....	.....	.....	.....	92.50	56.00	70.00	.....	81.00	75.00	76.50
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	5.40	6.83	6.00	.....	5.76	7.00	7.00	5.20	5.80	.....	8.00	.....	3.65	.....	7.00	5.75	5.00	5.15
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.97	.....	6.50	.....	.....	.....	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	.....	6.37	5.80	.....	.....	.....	.....	6.00	6.75	6.93	8.00	.....	.....	.....	8.00	8.00	.....	7.00
Gypsum Plaster Board	3/8"	1,000 sq. ft.	.....	39.50	.....	.....	45.00	.....	50.00	32.50	37.50	45.00	52.00	55.00	34.00	.....	.....	.....	45.00	.....
Lime	Hyd. Com.	Ton	19.00	23.20	25.60	14.70	14.80	17.60	14.10	14.00	18.00	27.50	22.50	.....	20.00	20.00	28.00	25.00	25.00	.....
Building Sand		Cu. yd.	3.50	2.56	2.37	2.25	2.50	1.75	.....	1.80	2.81	2.00	2.75	1.15	1.75	.....	3.00	3.25	2.50	1.25
Crushed Stone	3/4"	Cu. yd.	3.60	.....	3.00	2.25	3.50	3.25	.....	2.50	3.00	4.00	2.60	3.00	2.00	.....	3.50	.....	2.25	2.75
Window Glass	Single A 10"x12"	50 sq. ft.	.....	3.90	4.50	.....	.....	4.20	4.50	4.50	.....	4.50	5.40	.....	4.42	4.43	.....	.....	.....	4.63
Hollow Tile	8"x12"x12"	Each	.....	.....	.22	.....	.....	.18	.14	.18	.....	.25	.21	.18	.25	.20	.19	.10	.....	.....
Cast Iron Soil Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	.....	.....	.....	.....	.....	65.00	.....	59.00	59.00	76.00	75.00	.....	.....	.....	.....	.....
Steel Pipe	1" galv.	100 ft.	.....	.....	.....	.....	.....	8.36	8.27	8.57	.....	9.40	9.40	11.25	12.00	11.03	.....	.....	9.85	9.90
Reinforcement Bars	3/4" square	100 lbs.	3.05	.....	.....	.....	.....	2.95	.....	3.00	.....	4.00	3.75	4.00	3.00	3.85	4.67	.....	4.25	3.05
Structural Steel	Fab. 6" I-beams	100 lbs.	3.45	3.85	3.80	.....	.....	3.25	3.90	3.25	.....	4.00	.....	.....	5.00	.....	6.77	.....	6.00	4.30
Gypsum Plaster	Neat	Ton	18.00	18.50	.....	.....	.....	16.30	22.00	19.00	.....	24.00	24.00	23.00	21.00	20.00	.....	20.00	20.00	.....
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	.....	.....	11.00	14.00	16.50	.....	12.00	.....	.....	.....	.....	.....	.....	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	3.10	.....	.....	.....	2.50	.....	2.15	2.25	.....	2.60	2.58	3.25	.....	2.30	2.85	2.25	.....	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	1.65	.....	.....	.....	1.10	.....	.....	1.15	.....	1.50	1.80	1.75	1.20	1.05	1.50	.....	1.50	1.00

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A group of nationally known experts on various technical subjects allied to building, providing a direct service to architects

THE editors of THE ARCHITECTURAL FORUM have been fortunate in obtaining the co-operation of the following recognized experts who constitute THE FORUM Consultation Committee. This Committee provides a service of the greatest value to subscribers in addition to the usual editorial service, and architects who seek information on specific questions in these various fields are invited to present inquiries.

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(*a*) That each Committee member shall be a representative leader in his line;
(*b*) That no Committee member has affiliations with any manufacturer;
(*c*) That no Committee member will be called upon for detailed service excepting by special arrangement;
(*d*) That a special editorial article on a subject represented under each of the headings below shall be prepared during the year by the Committee member.

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Professor and Head of Department of Agricultural Engineering, Ohio State University. Consulting Agricultural Engineer, Columbus, Ohio.

Specialist in land drainage, soil improvement, surveys, farm arrangement for economical production, purchase of equipment and economical layout of farm buildings with special reference to interior arrangement.

Address inquiries to committee members, care THE ARCHITECTURAL FORUM, 103 Park avenue, New York

THE FORUM DIGEST

A SURVEY OF IMPORTANT CURRENT ARTICLES ON BUILDING ECONOMICS AND BUSINESS CONDITIONS AFFECTING CONSTRUCTION

The Editors of this Department select from a wide range of publications matter of definite interest to Architects which would otherwise be available only through laborious effort

NEXT YEAR'S BUILDING COSTS

FROM *Building Topics*, the publication issued by Monks & Johnson, architects and engineers, of Boston and New York, we clip these paragraphs on the indication for the cost of building:

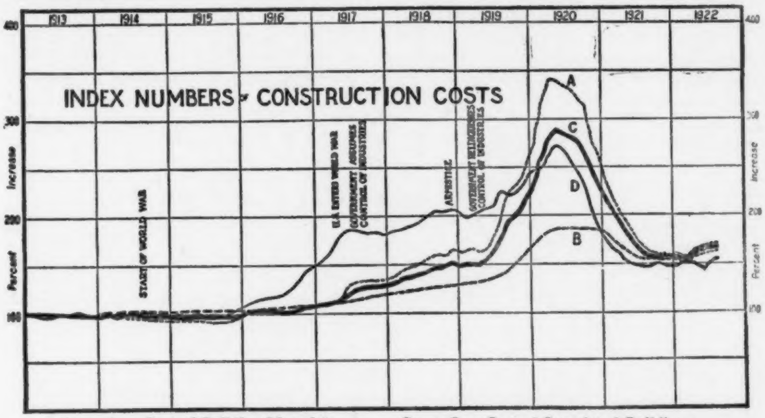
There are three general divisions of the cost of finished buildings:

(1) Material Cost, (2) Building Trades Wages, (3) Efficiency of Building Trades Labor.

Since March of this year, building-materials cost has been increasing. The March index-figure of the United States Department of Labor is 155, referred to the average of the year 1913 as 100. In April the index rose to 156; May, 160; June, 167; and the July figure was 170. This makes a 15-point rise since March. The primary reason for this increase has been the demand brought about by the large volume of building which always accompanies an upward swing in the business cycle. A secondary cause for this increase in material cost has been the coal strike. Brick and steel, and in fact every other building material dependent upon coal in manufacturing, have been raised very considerably over the figures that would have obtained if the coal miners had been at work since last April.

There are three general fluctuations in prices which are always in operation. The first of these is the very long-time trend. This is a slightly rising movement and has been due in the past primarily to the gradual increase in the amount of gold and silver in the world. It is in general because of this trend that wages, for instance, are so much higher now than they were in colonial times. However, the effect of this gradual increase is slow from year to year, or even from decade to decade, and it becomes noticeable only after the lapse of a very considerable period of time.

The second trend in prices is the slow and steady fall which has always occurred after a war, and which may be expected, through historical analogy, during the next 20 years. It is on this trend that so many people are placing their expectations of lower prices next year and the year after, but while it is undoubtedly a fact that this movement is now in operation, there is a third element of price fluctuation which they may have not taken into account.



Curve A — Cost of Building Materials
Curve B — Wages of Building Trades
Curve C — Cost of Completed Buildings
Curve D — Cost of all Commodities Combined

This element is the normal business cycle. The business cycle appears to have fluctuated in normal times with a period, roughly, of from three to four years between peaks. It has been caused in the past through the normal operation of the laws of supply and demand, as affecting the thrift and industry of the people, the availability of loanable funds, and thereby credit, and the movements of public confidence. From peak to low point, the fluctuation within any one business cycle has almost always been greater and more violent than in other movements affecting prices. We are now on an upward movement in the present business cycle, which began a little time before the first of this present year. Unless some totally unexpected and untoward events prevent the normal upward movement of the cycle, we should expect constantly improving business, constantly increasing demand, and as a result, upward movement of prices, until the end of this cycle.

It now costs 15 to 20 per cent more to build than it did in the first part of March of this year. We do not think it likely that lower building costs will obtain for at least 18 months.

THE QUESTION OF RENT REDUCTIONS

IN a recent issue of *Forbes' Magazine* a number of interesting comments were made by John Oakwood, relative to the downward revision of rents and real estate values. He says: "The housing shortage in the United States has passed its acute stage. The greatest building boom in the history of the nation has driven away this chimera from domestic life. The prospects for this fall's renting season are for a larger volume of houses to choose from, greater competition for tenants, and a consequent further easing of rents which has already made substantial progress in some places.

"The cost of homes for purchase has made even greater progress toward normal than have rents. Lower building costs as compared with the peak period, a slowing down in the rate of buying, easier money for financing homes, the coming of distress property onto the market, and a surplus of houses for sale even while the renting property shortage continued, all contributed to bringing down prices. The prospects are for easier conditions also in the purchase of property this fall, and for a more marked decline in values next spring.

No Collapse in Sight

"*But in neither case—that is, in the cost of homes or in rental—is there a collapse in sight.* Neither is there a prospect of a return to inflated conditions. There is a distinct advance evident at the present moment in building costs, due both to the paring down of stocks of materials by the tremendous, record-smashing volume of building this year, and also in some sections to retarded distribution due to transportation difficulties. Likewise labor scarcity in some directions has raised prices. But the ultimate solution of the labor situation, the full swing under which the building materials producers are now operating, and a lessening pressure for houses may be expected to prevent this upward trend from going much further. There are evidences, in short, that the building and housing situation, although bound to see-saw somewhat yet, is re-

turning toward equilibrium and that the next two renting seasons, that is, this fall and next spring, should go far in the direction of normal stability.

"Rents will remain higher, building materials will be dearer, homes will be more costly to purchase than they were before the war, but so are general price levels and wages higher. Therefore, in coming to comparative rest at points above the 1913 level, housing figures will merely be conforming to the new normal.

"In New York, where the housing crisis was very acute, total construction contracts awarded during the first six months of the year totaled $305,700,000—more than double the amount for the first half of 1921. Of this huge total, 58 per cent was for residential construction, estimated as representing housing provision for 105,000 persons.

"The general movement of lumber thus far in 1922 has been in excess of that in the same period in 1920, the best year previously recorded. The cut, however, has not been so great; so that there has been a reduction in reserve stocks.

"Similar conditions prevail in other building material lines. For cement, production in the first six months of 1922 is reported as running 10 per cent above last year, with shipments 20 per cent higher; so that stocks have been considerably reduced. Brick orders are also reported far in excess of supplies on hand.

"The natural result of these conditions, along with increased labor and manufacturing costs, has been rising prices. Since it is estimated that labor constitutes 40 per cent of building costs in residence construction, wage changes are an important element, and the labor outlook is a controlling consideration in judging the building and construction outlook.

"The wholesale building materials price index number of the Bureau of Labor Statistics has advanced from its post-war low point of 155 made in March this year, to 167 in June. In this index, the 1913 average is the base of 100. The peak of this index was 300, reached in April, 1920. Thus, though current prices are 67 per cent above the pre-war level, they are 133 points or 44 per cent below the post-war peak. The course of this building index during the nation's greatest building era comprised in the last two years and a half is shown in the following:

Building Materials Index

	1920	1921	1922
Jan.	274	192	157
Feb.	293	180	156
Mar.	297	173	155
Apr.	300	167	156
May	293	165	160
June	275	163	167
July	269	160	
Aug.	265	156	
Sept.	255	156	
Oct.	240	159	
Nov.	215	163	
Dec.	204	158	
Year's Ave.	264	165	158.5

"The course toward higher levels of two leading building materials since the first of the year, typical of other materials, is shown in the following:

1922	Yellow pine	Brick
Jan.	49.50	15.00
Feb.	49.50	17.50
Mar.	49.50	18.00
Apr.	49.50	16.50
May	51.50	16.50
June	51.50	20.00
July	53.00	20.00
Aug.	53.00	21.00
1921		
Aug.	47.00	18.40

"The foregoing picture of boom activity and rising building costs may seem to imply the development of a new inflationary situation.

"There is little probability of re-inflation in this field. Inflation here has gone the way of inflation in industry, commerce and finance, and there are forces to prevent its return. The expansion in building activity is the direct outcome of an accumulated demand resulting from the war and post-war years when the normal annual increment to the nation's housing and building equipment was not made. As this accumulated shortage is reduced, building activity will return to a normal scale, keeping pace with the annual requirements arising from increased population and depreciation of existing structures.

"There are indications that excessive building activities have started to reduce the abnormal housing deficit. It is partly on these indications that the forecast for easier rents and more moderate purchase prices for residence property is based.

"The indications of a reduction in the cumulative shortage that piled up during the war and post-war years of curtailed construction are found in the following facts:

Eight Years Before Normal

"It is estimated that normally the homes required by the nation each year to accommodate increased population total about 325,000 and that 275,000 new houses are needed to replace aged or destroyed structures, making total normal requirements of some 600,000 a year. It is estimated that only 260,000 new homes were built in 1920; 525,000 were built in 1921; and that fully 785,000 will be the total for 1922.

"This indicates, therefore, that the building of homes this year will be about 30 per cent in excess of the normal requirements of 600,000,—some 185,000 homes, in other words, to be applied in cutting down the accumulated deficit of the underproduction period.

"Just how large this deficit was it is impossible to say, but guesses have gone as high as the equivalent of two and a half years' normal requirements, or 1,500,000 homes.

"Accepting this high figure without qualification, it would take between eight and nine years to wipe it out if the rate of surplus house production established this year were maintained.

"But there are other important social factors to consider besides these bare statistics. One of the most important is that the emergency demand for houses brought almost to an end the abandonment and destruction of houses because of age or disrepair.

"Fifty years has been called the average age of a dwelling, but this average did not hold in the crisis. Multitudes of old and dilapidated dwellings that would ordinarily have been scorned were re-conditioned. Although statistically they all theoretically appear above on the debit side of the account, as a matter of fact many of them have remained in use—in many cases in increased use through additions.

"The immediate past holds guidance for the future. It will be remembered that the beginning of the building boom was retarded and did not gain full swing in 1920 due to the persistence of high prices in the building material and labor costs. Materials producers and building trades workers fancied they had the public by the throat, that housing was a necessity in which there was a tremendous shortage and that almost any prices could be demanded.

"Greed defeated itself. The building program for a time almost stopped. This was caused not only by some builders realizing that the public was being driven to adopt new living habits that would be reflected ultimately in a softening of demand for homes, but also by the fortunate timidity of capital. Builders found it difficult to finance construction on an inflated basis of materials and labor costs. It became evident that the margins protecting a mortgage interest in real estate could not stand up against the deflation in house values that was bound to ensue.

Present Conditions Temporary

"The scarcity of mortgage money retarded the building movement for a time, contributing to the deflation that finally occurred in materials and wages. But capital came back to the building movement when it got re-started on a sounder cost basis. However, like all prices, building materials in some lines reacted too far. Some of them went below fair prices. Profits for the producers were wiped out. The present advance in prices, just as earlier in farm products, is serving to correct this uneconomic condition. It is my belief that the building movement is now based on fundamentally sound conditions.

"It is my forecast that the anomaly of falling rents and home prices with rising materials prices is temporary; that materials prices will not go so far as to block the downward revision of rents and real estate values. If labor, builders or landlords try to jack prices up, stagnation will develop.

"There are still large unsatisfied demands for homes both to rent and buy, but this demand will not seek satisfaction at past or present levels. The housing shortage has been largely answered by a repression of demand that is elastic enough to meet conditions. Demand will remain restricted if prices again become restrictive."

SUGGESTED METHODS OF REDUCING COAL CONSUMPTION

"BUILDINGS and Building Management" of September 18, 1922 reports a series of recommendations for reducing coal consumption as suggested by the fuel committee of the Building Managers and Owners Association of New York. These suggestions are reproduced in view of the fact that they may prove of interest to architects' clients who may be owners or lessees of office buildings and other structures where the reduction of coal consumption will be mandatory this winter. The regulations are thus quoted:

"*Office Buildings.*—1. No heat, light, power or elevator service shall be furnished from 7 p.m. to 6 a.m. or on Sundays or on legal or state holidays.

2. No live steam is to be used for hot water heating from May 1 to October 1, excepting for the purpose of cleaning the building.

3. Cut down elevator service at least 25 per cent from maximum during business hours.

4. Cut down all electric lighting in offices, hallways, etc., at least 25 per cent from maximum.

5. No heat shall be furnished from May 1 to October 1.

6. Shut off all radiators near open windows.

"*Lofts and Mercantile Buildings.*—1. In stores, lofts and mercantile buildings, no live steam for heating or for commercial purposes shall be used between the hours of 6.30 p.m. and 6.30 a.m.

2. No live steam shall be used for heating or commercial purposes on Sundays or holidays.

3. No heat shall be furnished from May 1 to October 1.

4. Cut down the use of commercial steam by shutting off the valves to apparatus that is not in use.

5. Throw off all belts of machinery not in use.

6. Cut down all electric lighting at least 25 per cent from maximum.

"*Apartments and Dwellings.*—1. Discontinue all use of live steam for vacuum cleaners, laundry driers and tubs.

2. All outside lighting to be discontinued except lights necessary for public safety.

3. Temperature of hot water at tank shall not exceed 150° F.

4. Cut down all electric lighting in apartments and hallways, etc., at least 25 per cent from maximum.

5. Cut off the supply of heat at source between the hours of 10 p.m. and 6 a.m.

6. No heat shall be furnished from May 1 to October 1, and then only if outside temperature is below 50° F.

7. Radiators near open windows must be shut off.

"*General.*—1. Do not have the temperature in any space above 68° F.

2. Shut off all lights in sunlighted areas and in show windows during daylight hours.

3. Whenever possible, regulate heating systems so that no steam will escape through exhaust headers.

"*Modification of These Regulations.*—The recommendations concerning heating to apply to all classes of buildings when the thermometer is 10° above zero outside. When the temperature is lower, sufficient heat may be provided for the protection of pipes.

Fuel Conservation in Power Plant

1. Weigh the coal and record the amount of coal used on each watch or shift.

2. Measure the feed water and see that it is properly heated.

3. Make provision for the correct supply of air to the fuel and see that the draft is properly controlled.

4. Keep boiler surface clean on the inside and outside and see that the boiler is regularly blown out.

5. Keep the grates in good repair and see that the settings and breechings and access doors are kept free from air leakage and that the boiler surfaces, which waste heat, be covered with proper insulation.

6. That the surfaces of the steam piping, the drums and feed water heaters are properly covered with insulated material to prevent any loss by radiation.

7. Stop all steam leaks and keep the steam traps in good repair to prevent steam blowing through.

8. Utilize exhaust steam wherever possible to the exclusion of direct steam from the boilers.

9. Trap all clean returns back to your feed water tank.

10. Place a competent man in your plant to be detailed for the work of fuel conservation in both the boiler and the engine room.

Steam Grades of Anthracite in Heating Furnaces

1. No. 1 buckwheat, and even small sizes of anthracite coal, can be burned in the ordinary furnace with shaking and dumping grates, if a bed of ashes is allowed to accumulate under the coal, providing there is sufficient draft.

2. The average furnace, for at least 60 per cent of the time, operates below its capacity and during such times steam sizes of coal will supply the necessary amount of heat.

3. The smaller sizes of anthracite can be used at night to bank fires and on warm days, thus saving the larger sizes for use in severe cold weather.

4. At night, after the fire is shaken down and some of the larger coal put on, the fire can be banked for the night by shoveling on a top dressing of No. 1 buckwheat.

5. In the morning, the furnace should be shaken down as usual and fired with some of the large coal.

6. In mild weather, after the fire has begun to burn well, it can be checked or banked by using a quantity of buckwheat as a top dressing.

7. The two sizes of coal should never be mixed, but kept in separate bins. The buckwheat should be used only as a top dressing.

Mixture of Steam Grades of Anthracite with Semi-Bituminous in Steam Plants

1. If the furnace equipment is designed for pea coal or larger sizes of anthracite, steam sizes of anthracite may be used by mixing a small amount of semi-bituminous coal with No. 1 buckwheat or smaller to act as a binder to hold the fire on the grates, and also to increase the calorific value. The amount necessary to bind the fuel varies from 5 to 10 per cent. This mixture can be burned without smoke. Smaller sizes of anthracite may require as much as 20 per cent of semi-bituminous.

2. It is often advisable, when untrained firemen are handling these mixtures, to have a small pile of semi-bituminous on the boiler room floor where the men can get it to fill holes or thin spots that may develop in the fire.

3. Proper mixing is most essential. It may be done either by delivering in wheel-barrow alternate and pre-determined portions of the two kinds of coal, and then mixing by not less than two turn overs with a shovel before dumping in front of the furnace; or on a larger scale by a similar delivery of carload lots to the coal tipple.

SAFE CHIMNEY CONSTRUCTION

FROM the *Heating and Ventilating Magazine* for September, 1922, we quote these paragraphs:

"According to the Actuarial Bureau of the National Board of Fire Underwriters, defective chimneys and flues are responsible for more property losses than any other of the four divisions into which heating plants are divided in the list of fire causes. Defective chimneys and flues stand third in the list of major fire causes, the list being led by electricity and matches-smoking.

Cause of Chimney Fires

The reasons why chimneys are such a fruitful source of fire have been thus summed up:

1. Use of terra cotta sewer-pipe or other unprotected tile or hollow blocks for the chimney;

2. Construction of chimney with bricks laid on edge instead of flat;

3. Chimney walls built with brick flatwise or only one brick thick, and flues unlined;

4. Supporting chimney on the timber construction of a building or upon brackets; or insufficient masonry foundation, when the chimney rests on the ground;

5. Two or more connections to the same flue;

6. Building woodwork into the wall of a chimney, or placing it in contact with its exterior;

7. Smoke-pipes arranged to enter a chimney in vertical line;

8. Carelessness in sealing connection between smoke-pipe and the chimney, and failure to anchor the pipe to the chimney;

9. Carelessness in not renewing a rusted smoke-pipe and also in allowing

combustible material too near the pipe;

10. Carelessness in not keeping the chimney clean and the joints in the brickwork properly pointed.

Recommended Construction

A chimney should always be solidly built upon an independent and indestructible foundation. It should never rest upon wooden construction because this will cause shrinkage and settling, with the result that the chimney is very likely to crack and permit the escape of sparks.

In some parts of the country it is a common practice to suspend a chimney from floor or roof timbers by iron hangers. This is a dangerous custom and should not be permitted.

A chimney wall should never be less than 3¾ inches thick (the width of a standard size brick) and should be lined with chimney tile. This is important, since in the absence of this lining the mortar between the bricks will eventually disintegrate and fall out under the action of heat and the gases of combustion. For these reasons, plaster is not a satisfactory lining as it is sure to crack and fall off in the course of time. Fire clay chimney tile, manufactured for the purpose, is the only safe material and its use adds little to the cost of construction. Excess mortar at the tile joints should be carefully removed so that the flue will present a smooth surface which will create a good draft and keep the accumulation of soot at a minimum.

Building chimneys with bricks set on edge is dangerous as it makes thin, unstable construction that soon causes the cracking of the mortar and the development of crevices between the bricks. It is considered imperative that the bricks should be laid flatwise. The practice of building woodwork into a chimney wall should never be permitted, nor should it touch the chimney, a separation of approximately 2 inches being necessary for safety. This applies to all floor construction, partitions, rafters, roof boards and shingles.

Where a chimney passes through a floor, the space between the floor timbers and the chimney should be filled with some porous, incombustible material, such as cinders, refuse plaster or mortar, held in place by a sheet of metal nailed to the underside of the wooden beams. Neither solid mortar nor brickwork should be used to fill the space, since they will transmit heat. Gypsum blocks sawed to fit the space constitute one of the best materials for this purpose. At the roofline sheet metal flashing, set into the joints of the brickwork and overlapping the roof boards, should be used.

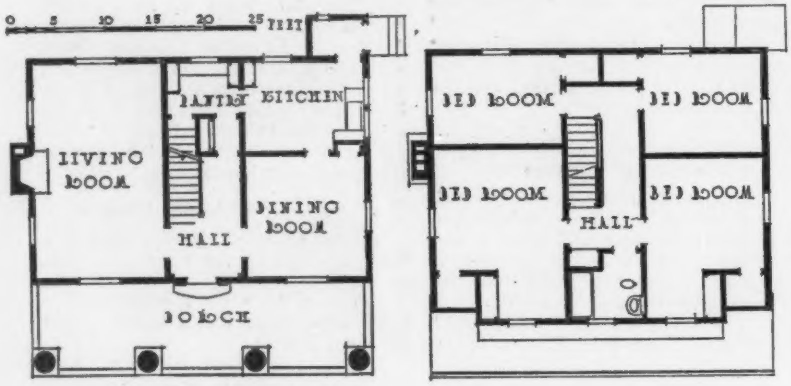
It may be mentioned that filling the space between the chimney and the woodwork has two important results. In the first place it prevents a fire, originating on a lower floor, from passing up behind a partition or furring into upper stories or the attic, and also avoids the possibility of rats or mice building nests in these spaces and thus filling them with highly combustible material, which in time may be ignited from heat transmitted through the chimney wall. Woodwork frequently catches fire in this way.

It is stated in the model ordinance that a round flue will give a better draft than a square or rectangular shape having the same cross-sectional area, and it advocates using the round kind when practicable. When such flues are placed inside rectangular chimney walls, however, care must be exercised to fill completely the corner spaces. Otherwise there is likely to be a leakage of air which would detract from the draft, and also increase the fire hazard.

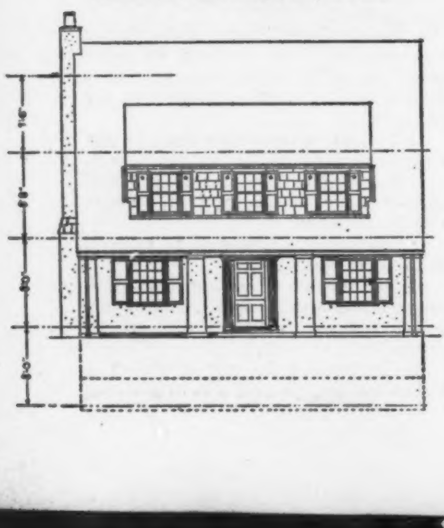
Method of Testing Chimney

It is advised that chimneys, both new and old, be tested by building a smudge fire at the bottom of the flue, and while the smoke is flowing freely, closing the flue at the top. The escape of smoke into other flues or through the chimney walls will indicate openings that should be closed up.

Monthly Estimates on Typical Small House



Floor Plans and Elevation of Typical House on Which Estimates Are Based



WE have submitted working drawings of this house, together with a quantity survey of materials, to a representative contractor in each of the cities named, and have secured bona fide estimates which are tabulated below. Specifications are in accord with good practice in the several localities as found in houses of this size built under the supervision of architects. The figures are for the cost complete, including contractor's overhead and 10 per cent profit, but excluding architect's fee.

The cubage of the building is figured from the first floor area exclusive of porches and a height measured from 6 ins. below cellar floor to half point of gable, to which is added cubage of kitchen entry and half the cubage of porch, taking height from footings to plate of dormer.

COST OF HOUSE (Cubage, 27,150 ft.)

Total and cubic foot costs for four months in two Eastern cities:

	Baltimore	Boston
June	$10,272.50	$10,906.50
	.378	.401
July	10,272.50	10,480.91
	.378	.386
Aug.	10,272.50	11,106.76
	.378	.409
Sept.	11,329.70	10,677.85
	.417	.393